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RHODESIA

REPORT OF THE SECRETARY FOR AGRICULTURE

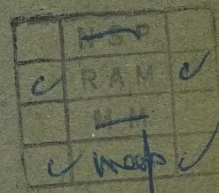
for the period

1st October, 1967, to 30th September, 1968

Presented to Parliament of Rhodesia
1969

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**REPORT OF THE SECRETARY FOR
AGRICULTURE**

**(which includes the Economics and Marketing
Branch, Co-operatives and Loans Branch, the
Departments of Research and Specialist Services,
Conservation and Extension and Veterinary
Services).**

**FOR THE PERIOD 1st OCTOBER, 1967, TO
30th SEPTEMBER, 1968.**

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Report of the Secretary for Agriculture

for the period 1st October, 1967, to 30th September, 1968

World agricultural situation

THE year 1967 was one of record output for world agriculture and, most significantly, a record for the less-developed countries. In general, this trend has continued during 1968, but with fluctuating fortunes between the various major commodities. The position in 1968 was complicated to some extent by the devaluation of the pound sterling in November, 1967, and similar action by other countries.

World grain production, which had advanced slowly over the 1960-65 period, expanded rapidly in 1966 and 1967. In 1968 a record wheat crop is expected and, whilst the situation for feed grains is not expected to reach new record levels, considerable surpluses are expected. In the case of rice and sorghums the position was generally one of demand exceeding supply. Following little change in world rice production over the period 1963-66, the world rice harvest increased by almost 10 per cent. in 1967. However, exportable surpluses remained small, as most of the increase occurred in the importing countries. Production in 1968 does not appear to have alleviated the position, and world prices for rice remain high. A steady demand continues for sorghums.

Cotton production in 1967-68, estimated at 47,100,000 bales, was the smallest since 1961. For the second consecutive year the reduction occurred mainly in the United States. The final ginnings of the crop in the United States showed the smallest harvest since 1895. Despite the higher prices prevailing in 1968, and increasing competition from synthetic fibres, it is estimated that world consumption of cotton this year will reach a new record level. Indications point to expanded production in 1968-69, although this is likely to arise from higher yields rather than from increased acreage.

The market for sugar remained somewhat depressed and, with the latest production estimates for 1967-68 indicating a slight rise over 1966-67, little change is expected in the prevailing low values for sugar.

The world tobacco situation continued to be dominated by the United States and exports from that country have, over the past two years, been

running at record levels. The U.S.A. has not failed to take advantage of the sanctions imposed against Rhodesia, which was her main competitor. Increased sales have been mainly to the United Kingdom and Continental markets. Whilst production of flue-cured tobacco in the United States has, in recent years, been somewhat static through the operation of an acreage-poundage quota system, production increases have been apparent in other major producing countries, especially Canada and India. Indications are that South Africa will also produce, this year, the second largest crop ever. Demand for tobacco has shown no marked fluctuation but, with the absence of Rhodesian supplies to major consuming countries, price levels have tended upwards.

In respect of oil-seeds, over-all world production has, in the past two years, shown an upward trend. This increase has resulted in the market for oils being depressed, with the position being aggravated by the increasing world surplus of animal fats, especially butter. Increased oil-seed production has been largely accounted for by soya-beans, ground-nuts and sunflower seed. A record olive harvest is expected in Spain this year and improvement is expected in palm-oil production in Malaya and other areas of the world. The oil-cake and edible nut markets have, in contrast to the oil market, remained reasonably firm.

The world's major meat producers registered a combined record output in 1967, which represented a 3 per cent. increase over 1966 and a 12 per cent. gain over the 1961-65 average, showing that world meat supplies are responding to growing demand. In the major producing and importing countries, the United States and the European Economic Community, meat production was up sharply in 1967, but in other countries the increase was only minor. World cattle numbers have shown signs of levelling off, the 1 per cent. increase in 1967 being less than that taking place in the past few years. World beef and veal production in 1967 rose 2.2 per cent. over 1966, with pork production registering a 4.5 per cent. increase, and that for lamb, mutton and goat production 1 per cent. With the rapid increase in pork production, which resulted in pig prices reaching lowest levels in recent years, production in 1968 shows signs of

levelling off. In the case of mutton and lamb, a further increase in production is expected in 1968.

A dominant feature in the world market for dairy products has been the appearance of large surplus stocks of commodities, especially butter and milk powders. World milk production has shown a marked increase over the past two years and, with fresh milk consumption showing only minor gains, production of by-products has increased accordingly. With stock levels of butter and milk powders reaching record levels, and a continued expansion in milk production, no lasting recovery in world market prices can be expected in the near future.

Depending on the extent to which agricultural production of any commodity is exported, so the prices prevailing on world markets are a major determinant of average prices received by farmers. Where the level of local production is such as to be insulated from world market prices, changes in domestic prices play an important role. In this latter respect the spending power and demand of the local market in relation to production levels, together with the availability of substitutes, must be borne in mind in relation to consumer, and hence producer, price levels. Whilst certain countries are capable of heavily supporting their agricultural sector, in many countries this is not always possible. A highly developed and industrialized country provides a huge internal market for its agriculture, and can support it for strategic and social reasons. In Rhodesia the position is very different. We must rely heavily on agriculture to increase the purchasing power of the local market and thus provide a base for development of other sectors of the economy.

In the light of the general survey of production and demand trends given earlier, one cannot be very optimistic that short-term future trends for agricultural prices on export markets are likely to improve to any extent. Apart from the cattle industry, the level of producer prices in a number of countries for which information is available has shown a downward or static trend. Net farm incomes, on the other hand, for the same countries show, on average, a slight improvement during 1967. Increased output was the major factor in this situation. Information relative to 1968 is not yet available, but indications lead one to believe that the level of farm incomes will show a static or downward move. A comparison of the situation in Rhodesia with other countries shows a similar situation to that above, but cognizance must be taken in this regard to the position under

which Rhodesian agriculture has operated in recent years and the disastrous seasonal conditions this year.

Since the last report, there has been an extension by outside influences of economic sanctions. This action in mid-1968 resulted in the extension of mandatory sanctions to practically all import and export commodities of the country. For the continued well-being of the country such action had to be countered and, in this regard, the many facets of the agricultural sector responded magnificently, in spite of the fact that the industry suffered its worst climatic season possibly in its history. Unfortunately, it remains necessary to curtail to the bare minimum statistical information on such achievements. However, there is no hesitation in stating that the industry continued to be to the fore in ensuring the continued economic viability of the country.

Seasonal conditions and effects

Apart from 1966-67, farming conditions through the vagaries of the weather have, over the past few years, generally been unsatisfactory, but not to the extent experienced this year. Whilst the position up until about mid-December was generally good, especially in the Midlands, erratic rainfall over the whole of the country from then on resulted in drought conditions approaching disaster level. To aggravate the position, the country in mid-June experienced widespread frost conditions regarded as the worst for some 50 years.

With such harsh conditions pertaining, the question of drought-relief became a pressing one. However, due to the widespread nature of the drought, it was necessary to assess the situation on a national rather than on an area basis. This necessitated extensive planning and assessment, and account taken of the over-all problems facing the economy.

Drought-relief plans which were announced by the Minister on the 2nd April, 1968, were far-ranging and on a scale unprecedented. The measures covered, in general terms, such aspects of agriculture as water, beef production, dairying, food crops and tobacco. Some of the more important were the granting of rebates on the cost of geophysical surveys and boreholes, allocation for a further £50,000 to the Farm Irrigation Fund, priority bookings for slaughter stock, bonus payment on non-slaughter stock which, by necessity, had to be disposed of, transport subsidy on stock movement, additional loan facilities, payment of

premiums on milk, cream and butterfat deliveries, and compensation payments to crop farmers. Premiums and compensation rates were calculated following the assessed degree of drought through field investigation.

In the assessment of the individual's degree of drought, which was based on reduction in gross farm income, the individual had to carry the first 20 per cent. of the loss, premiums and compensation then being granted *pro rata* to the degree of loss. Drought-relief grants were not made in cash but a credit account was opened in the name of the individual, against which approved expenditure could be met.

Measures such as these entailed organization of a high order and at various levels. An indication of the size of the exercise, which is continuing, can be gauged from the fact that some 2,700 drought-relief applications had been received from European farmers covering, in many cases, both livestock and crops, and some 4,700 from African Purchase Area farmers.

It is too early yet fully to assess the effects of the abnormal weather conditions this year, but there is ample evidence to indicate that production levels in many instances will be well below average. Where lower aggregate crop-levels have not resulted, this has been due to the increased acreage planted this year, but even in these cases average yields will be well down. In the case of dairy production, however, intake of milk by the various dairies has shown a marked increase. The over-all financial implications to the farming sector of such a season is a question, the answer to which is not readily assessable in the short term. It is certain, however, that these are very serious. Moreover, the drought hit the industry when, generally speaking, its financial reserves were low.

Patterns of production

Whilst the changing trends in regional patterns of production were becoming apparent in the early years of this decade, the movement has been marked in the past three years. Initially, the movement was associated with changing production techniques, especially in the case of tobacco. The earlier water-planting of the tobacco crop enabled grain crops to be planted at the optimum time without conflicting with tobacco, and the operations necessary for these crops were more complementary than competitive, especially for labour resources. Livestock, both beef and dairy,

also were becoming more prominent in the higher-rainfall areas, but this aspect was probably arising from diversification and cattle movements northwards, due to unfavourable climatic conditions rather than to changing production techniques. However, the greater availability of grain crops and fodder could be an added factor.

In recent years, the enforced cut-back in tobacco acreage has created the atmosphere for accelerated change in production patterns. Such a situation can be appreciated more fully when the question of maintaining farm incomes enters the picture, and the relative profitability of other crops to tobacco. Estimates indicate that from three to five acres, depending on the alternative crop, are required to return a similar level of income to one acre of tobacco.

Unfortunately, for reasons well known, recent changes in crop acreages and livestock numbers cannot be given, but over-all, in recent years, there has been an increase in crop acreages of the order of 30 per cent. and livestock of the order of 10 per cent.

Within these over-all increases, however, there have been far greater increases within certain regions, this being most apparent in Mashonaland North, followed by Mashonaland South and Manicaland. Other regions, in which tobacco production hardly existed, have shown a relatively stable level of crop production and a small decline in livestock population, the latter no doubt reflecting the climatic situation.

In many instances, this diversification of crop and livestock production was undertaken by farmers whose experience of these forms of agricultural production was somewhat limited. It is, therefore, indeed creditworthy to note that yield levels in general have been well in excess of national levels, and in some cases exceeding those pertaining to traditional areas for the respective crops.

Farms costs and income

In assessing the viability of a sector of the economy one usually has available a number of financial indicators. Indicators in the case of agriculture cover such items as net farm income levels, taxpaying enterprises, cost-of-production data, farm indebtedness and input/output accounts. These indicators, either solely or in combination, are by no means conclusive determinants of the industry but are, nevertheless, the best available. At best they provide a picture of

the average farm enterprise but it is really the individual enterprise which is of prime importance. The wide range from the average is well known, varying from a very satisfactory position for one to a distressing one for another.

The criteria which determine the end result of any of the above-mentioned indicators are, of course, the levels of farm inputs and outputs. In the case of farm inputs the farmer can exercise a greater, although not complete, degree of control over these than is possible with output levels, which are largely determined by seasonal conditions linked with market prices. However, output levels can be influenced by the level of management undertaken by the farmer in ensuring the application of good husbandry practices through all stages of production.

Total farm input costs showed a rising trend up until 1965, followed by a downward movement in recent years. Total farm output followed a similar upward trend but with a levelling off in recent years. Gross incomes, after allowing for these changes, have been relatively stable in recent years, with a noticeable upward swing in 1967. In the light that input items have shown a general price rise alongside the absence of any significant producer price increases, indications are that there have been marked increases in efficiency in the industry. Notable within these has been an increasing level of productivity per acre of land and animal unit, together with more efficient management control over input requirements. Recent farm management and cost of production surveys tend to confirm this situation; and this is especially apparent in the case of tobacco, prices for which have been well below pre-1965 levels. It has often been stated that, within limits, it is the price received for the product which determines its cost-level, i.e. unit costs follow, fairly closely, established prices; and trends in Rhodesia support this pronouncement.

The question as to how much further increasing yields can be taken to offset rising costs is a matter of some conjecture. Naturally, there must be a limit, and yields will vary from area to area, due to differing ecological, geographical and climatic factors. However, the wide range of yields which are apparent within specific areas point to the fact that further over-all improvement is possible.

The availability of money (very often the limiting factor) is the root of farming. It is the efficient utilization of this resource in order to obtain the

maximum return which requires constant consideration. There is no doubt that many financial decisions taken by farmers are put into effect with little exploratory work as to the short- or longer-term outcome. All too often a bad financial result is blamed on the price received, whereas the true reason lies elsewhere. A wealth of information which can assist the farmer to make better decisions is becoming available. This, together with the simple records which can, and should, be maintained by the farmer, are proving of immense value, and it is in this field of management control that there is room for considerable improvement.

Nothing is static—and this is very true in agriculture. Our rainfall is variable. Market conditions of supply or demand fluctuate. Technological progress is rapid. There must be a flexibility in policy. We must adjust to circumstances because we cannot order circumstances to suit a policy. This is why it is vital to maintain and improve research in both the production and marketing aspects. If we fall behind here, the consequences will be horrible indeed.

Irrigation

On the Rhodesian scene the emergence of irrigation farming has become a noticeable feature in recent years. Development of large irrigation projects in the lowveld tends at times to overshadow the development taking place in the rest of the country. Although, individually, these latter schemes are small in comparison, combined, their acreage and output are very favourable factors to the continued advancement of the agricultural industry. The availability of water, for both winter and supplementary summer cropping, together with the advantages it creates in the field of livestock husbandry, has shown its worth during the past season. There is no doubt that, but for the foresight in establishing irrigation facilities, the over-all agricultural situation this past year would have been far worse.

The total acreage under irrigation now amounts to some 10 per cent. of the total area under crops, a vast difference to the position a few years ago when the figure was of the order of 5 per cent. Total capital investment in such expansion may, on the surface, appear out of proportion to normal investment in farming operations but, when considered in the context of the doubling of yields, avoidance of crop failures, maintenance of livestock, etc., its worth to the national economy is readily appreciated.

I consider a note of caution to be necessary. Irrigation facilities are of immense value only if properly used. This requires study and a strict farming régime. To lose the chance of an additional crop, to get less than what is possible, removes the profit, and the capital which has gone into a scheme can become a heavy and painful burden.

Farm Irrigation Fund

From its inception, in June, 1966, approved applications, covering ordinary loans, boreholes and tobacco diversification loans, have numbered 967. The amount committed is of the order of £1,700,000, covering costs of dams, weirs, boreholes, pumps, piping and canals. Estimated capacity of the facilities for which loans have been approved is of the order of 26,000,000,000 gallons. Besides providing essential water-supplies, additional irrigable acreage approaching 34,000 acres will become available throughout the country.

Such progress must be considered heartening, and there is every indication that demand from the farming community for this type of assistance is continuing. Unfortunately, limitations had to be placed on the finance available for loans of this nature but every effort is being made to increase this. A supplementary amount of £50,000 was made available this year in the context of drought-relief. In addition, future years should see the repayment of loans to the fund, and these moneys will then become available for further disbursement.

In a season such as the one experienced this year, the value of irrigation facilities is uppermost. It is to be hoped that, with a succession of good seasons, this value is not lost sight of, and that farmers will continue to make use of the fund, together with their own resources. Such future action will continue to ease the effects of drought conditions by ensuring that production does not fall to dangerously low levels.

Marketing and pricing

The Agricultural Marketing Authority has completed its first year of operations. It gives great satisfaction to be able to report that it was a most satisfactory one. Despite the difficulties of marketing, due to sanctions, all commodities for which it is responsible have been successfully sold.

The authority conducts price negotiations, although producer organizations are not denied access to the Minister and Ministry when agreement cannot be reached with the authority. In every case, the authority reached agreement with producer organizations, and its recommendations have been accepted by the Minister.

As the various organizations responsible for marketing our major crops submit their own annual reports, it is only necessary for me to submit brief comments on individual items:

Tobacco

Government again decided to support the flue-cured, burley and samsun tobacco crop for 1968-69. As regards flue-cured tobacco, the first decision was to support a weight of 132,000,000 lb., at an average price of 22d. per lb., together with a quota purchase scheme for those who might wish to give up growing, and also the provision of funds for diversification loans. The Rhodesia Tobacco Association made strong representations that an average price of 22d. per lb. would be inadequate to maintain the production sector of the industry, and called a special congress to discuss the question. In the event, the original decision in respect of the 1968-69 crop was amended to a maximum weight of 132,000,000 lb., at an average price of 25d. per lb., with no quota purchase scheme or special diversification loans. Support for 1968-69 burley and samsun crops was fixed at 5,000,000 lb., at an average producer price of 25d. and 1,000,000 lb. at 26d., respectively.

Maize

Early prospects of a bumper crop changed during drought conditions to a fear that internal requirements would not be met. In the event, these fears proved to be groundless and it is clear that today, thanks to research and the ability of Rhodesian farmers, Rhodesia can produce maize even under the most adverse conditions. The producer price calculated on the basis of no element of assistance was 31s. 9d. per bag.

The Grain Marketing Board made a start with the construction of the first bulk-handling installation, capable of handling 83,500 tons of grain, at Concession. This is expected to be completed in the latter half of 1969.

The effect of a season on maize is very substantial. Yields can, and do, fluctuate enormously. The producer price is fixed in terms

of a formula under which the producer receives a sum equal to the difference between the board's selling price of 41s. 9d. a bag, less costs (these vary according to size of crop) for all maize sold on the internal market and net realization for exports.

Discussions between producers, the Ministry and the Agricultural Marketing Authority have been going on for some time in order to improve upon this formula but, so far, no better alternative has been found.

Cotton

Despite the cruel season, a record cotton crop was reaped at a producer price for Grade A of 8½d. per lb. seed cotton. Ginning was handled by the Grain Marketing Board with efficiency of the highest order, despite the climatic conditions which forced the early and simultaneous ripening of both low and middle veld crops.

A Cotton Marketing Board will be in operation to handle the 1968-69 crop. This board, which will fall under the Agricultural Marketing Authority, will work in closely with the Grain Marketing Board to ensure maximum utilization of common services.

It gives me great pleasure to report that relationships and co-operation with the Rhodesian Cotton Growers' Association have been very satisfactory and that the association has generously supported our research with constructive ideas and cash.

With the increasing production of the Deltapine variety, together with the possibility of increasing use of *machines for picking*, consideration has had to be given to price differentials. For the 1969 intake Deltapine will be priced ¼d. per lb. below Albar and *machine-picked* cotton will be priced 1d. per lb. below hand-picked.

The development of our cotton production has been dramatic. However, I feel it necessary to sound a note of caution. In my opinion, there is a risk of farmers in marginal cotton areas committing themselves too deeply, on the assumption that the current price of 8½d. will hold indefinitely. This is unwise. Whilst lint prices have remained firm over the past two years, there are indications of increased world production. Coupled with competition from man-made fabrics, a weakening of prices is a possibility.

This is not to say that there will not remain a satisfactory margin for the good grower in suitable areas, but it does mean that marginal producers could get hurt. Reaping is labour intensive, and I fear that some producers commit themselves in the hope, but not in the certainty, that labour will be available for picking. To lay out large sums of money, to suffer the agonies of worry and doubt through a season, and then to lose through labour problems, would indeed be heart-breaking.

Wheat

Further expansion of wheat acreages took place, mainly in the south-eastern lowveld. Considering the season and interruptions in power and water-supplies at critical periods, the results can be considered satisfactory. Very encouraging research results are being obtained, and I believe we can confidently look forward to yields per acre being rapidly improved.

The producer price of 67s. 6d. remains operative, and I would describe the future for this crop as bright, especially as we have a long way to go, quantity-wise, to meet the internal requirements.

Rice

Results of the 1967 plantings were disappointing in a number of cases, but it is intended to continue with the crop. There is an internal market and, if we can overcome production problems, it will be a useful addition to our range of agricultural production.

Grading and acceptance standards have been prescribed and the producer price for paddy is 5d. per lb.

Oil-seeds

The season had a very adverse effect on production. Despite incentive prices for ground-nuts and soya-beans, which will continue for the coming season, producers can only have been disappointed with their returns. It is to be hoped that the interest which was appearing will not be dampened by last season's unhappy experience.

Sorghums

There was an increase in the acreage put down to sorghum but this was influenced by late plantings following the failure of so much of

the maize plantings. Due to the season, there was a shortage of qualities suitable for the maltsters and some importation was necessary.

For the 1968-69 season an assurance of a minimum price for the top qualities, slightly above the 1968 level, has been announced.

Fruit

Increased plantings of citrus and deciduous fruit-trees, together with vines, took place this year. The local market was well supplied during the production season, although a shortage of apricots was apparent. Citrus production was adversely affected by the severe frosts and future planting may be curtailed due to loss of seedling stock. Supplies of grapes were well maintained and, apart from the fresh-fruit market, increased interest is being shown in the production of wine grapes. Local distillers are fostering this venture, whilst the Rhodesian Viticultural Association has been active in promoting all aspects of the industry.

The deciduous fruit industry continued its sales promotion programme and the National Mark Scheme was well received. During the year a Deciduous Fruit Co-operative was formed with a view to extending and improving marketing facilities.

Whilst the over-all expansion in the fruit industry is encouraging, sight must not be lost of the dangers of over-production. The local market is limited both for fresh and processed products. Seasonal flushes do occur and, with storage difficulties, which limit the selling season, producers should carefully consider the lines of production which they may be contemplating. It should also be remembered that under present conditions increased protection has been afforded to the local industry through the operation of currency control.

Potatoes

Generally, the demand/supply position was satisfactory although the occurrence of frost did affect supplies from the irrigated crops.

During the year, discussions took place between the Rhodesia Potato Association, the trade, Agricultural Marketing Authority and the Ministry in regard to the designation of potatoes and the introduction of a grading scheme. The first move in this direction occurred in August with the publication of the notice of intention to designate ware potatoes.

Over-production of ware potatoes gives cause for concern and here, again, intending producers should heed the advice of their association in this regard.

Beef

The prospects for the beef industry remain undiminished.

We expected a heavy increase in slaughtering because of the harshness of the season. In the event, this did not materialize and I regret to report that, as usual, poverty deaths occurred in the Tribal Trust Lands. The reluctance of the tribesman to dispose of his cattle with benefit to himself, the country, and to the veld continues to be a major problem.

I draw attention to the fact that the filling up of land in the higher-rainfall areas with cattle will restrict the ability to move cattle from the more drought-prone areas in the future. One cannot emphasize too strongly the essentiality of sound veld management and development of water resources (including stock watering-points) in these regions.

Producer prices remained unchanged over the period, but there were some changes in grade definitions designed to improve fleshing standards and reduce the wasteful slaughter of immature animals.

Initial development in connexion with the new abattoir at Gatooma was commenced and it is expected that it will be in operation in 1971. I would add that the pattern of cattle distribution shows, beyond doubt, the wisdom of the decision to site the abattoir at Gatooma.

Dairy

Milk production continues to increase and there is no sign of any slackening off. Milk is one of those commodities in which increases in production seem to occur almost irrespective of whether the price increases or decreases. This is due in no small part to the fact that it is a commodity which brings in a monthly income. The Dairy Marketing Board is doing an excellent job in the marketing field but, even so, producers can only expect a decreased unit price when increases in production outstrip market expansion — particularly the whole-milk market.

The question of a quota scheme was dropped following a referendum among producers. In my opinion, this was a correct decision.

A supplementary payment of ¾d. a gallon was made to producers in respect of deliveries over the period 1st July, 1967, to 30th June, 1968, giving a total payment for the period of 36¾d. a gallon.

Poultry

It may come as a surprise to many that the value of the poultry industry now ranks third in the livestock sector after beef and dairy. There are no formal or informal marketing arrangements for poultry. Nor does there appear to be any immediate need for such. Producers have now formed themselves into an association, and this is welcomed by the Ministry. The existence of a well-supported producer organization is essential for meaningful negotiations and for the development of marketing arrangements.

Pigs

This sector has consistently managed to conduct its own affairs with little recourse to Government. The year under review was no exception. Marketing has continued very satisfactorily through Colcom.

Sheep

Expansion in this sector continued through the year. Supplies to the internal market improved but there is room for more expansion. Present levels of prices are assisting development but, again, a note of caution must be sounded. Once self-sufficiency is achieved, further production must be exported. This will, without doubt, affect price-levels, and those considering entering this sector must take this into account in their planning.

Chinchillas

A noticeable improvement in chinchilla production is now becoming apparent and here, again, increased interest is evident. One of the problems has been the production of suitable pelts to meet customers' demands. On this score, breeders are being encouraged through the issue of guides to meet certain standards of excellence.

A chinchilla pelt marketing organization has been established to ensure that all pelts for export are of suitable quality. Following discussion within the industry and approaches to the Agricultural Marketing Authority, the notice of intention to designate chinchilla pelts was published in August.

Apiculture

Increasing interest has been shown in bee-keeping and estimates of honey production show an encouraging advance. Whilst the local supply position has improved, demand remains unsatisfied, especially in the manufacturing field. An opening, therefore, exists in this direction but it is essential that local producers should remain competitive, price- and quality-wise.

Research

During the year, the suggestion was put forward by producer interests that cotton research should be joined to tobacco research under a Tobacco and Cotton Research Board. It was claimed that this would obtain maximum advantage from the facilities of the Tobacco Research Board, would retain the services of scientific staff who had become redundant following on drastic modifications to the tobacco research programme because of financial stringency, would facilitate the recruiting of top-class scientists, would stimulate cotton research in Rhodesia and would give the producer a keener interest in, and more control over, research. The outstanding work of the Tobacco Research Board was quoted as evidence of what could be achieved.

This proposal was not favoured by the Ministry, which felt strongly that fragmentation of research was too costly. There are many aspects of research into one commodity which have an applicability to others. It was also felt that a commodity approach to research would also make it difficult for Government to recruit scientists of competence because of the narrowing field of the Government's programme, and would also be extremely unsettling to staff in all the professional departments of the Ministry. Furthermore, the Government record was a good one and, generally, the disadvantages, in our opinion, outweighed the advantages. This is not to say that we are in any way complacent about any aspect of our research. We freely accept that there is much which can be improved upon—and this includes cotton research. Within the funds which can be made available we are doing all we can to implement improvements. I also believe that the representations for an amalgamation of cotton and tobacco research was coloured to a degree by the proper desire to retain in Rhodesia the competent scientists about to become redundant in the Tobacco Research Board. It would be a fair question to ask if the same suggestion would be pressed if

tobacco production had not decreased because of sanctions.

Arising out of the argument, the Ministry suggested the setting up by legislation of a Research Advisory Board, charged with keeping under review the adequacy or otherwise of research in accordance with the country's requirements. This would bring in the producer at policy-formation level and would provide a suitable forum to offer advice to the Minister regarding the organizational structure of research in accordance with circumstances. It would also be charged with ensuring optimum use and co-ordination of all agricultural research facilities and bringing together interested parties such as Government, producer, the University and that part of the private sector to which the agricultural industry and its well-being are of great importance. This proposal is presently under consideration by producer organizations.

The Subsistence Sector

It is well known that a large part of the country is not yielding anything near its potential. I refer to the Tribal Trust Lands and the Purchase Areas. Their agricultural development is of great importance, both to the nation and to the individual. The mere fact that output from the Tribal Trust Lands is generally sufficient to feed the increasing population there, and there is an increase in the quantity of products coming out of the Purchase Areas, is an indication of some development. But the rate is slow, and I am afraid I have come to the conclusion that we would be deluding ourselves if we were to think that there will be any short-term, dramatic change. We find that to kindle interest and enthusiasm momentarily is simple. But to sustain it is another matter. The extension effort through the Department of Conservation and Extension and the Co-operative Branch is a dedicated one. The response varies from enthusiasm in the early stages to indifference—especially after a good season. In my opinion, the matter is not a straightforward agricultural one, although agriculture is the spark-plug. To bring unsophisticated people into contact with the complexities of commerce, banking, finance, etc., must be a rather bewildering experience. Time is required for assimilation and familiarity to develop. In the final analysis, the real problem is to change the outlook from a subsistence one to something more progressive. Once this has been achieved, the rest will follow. This, of course, is part of education. Commerce and industry look for the profit motive.

When there is spending-money available in these areas, so will all that commerce and industry can supply become more readily available; and this will, in turn, provide an incentive for greater effort on the part of the African farmer. The task is to get the wheel turning. It is beginning to move—but slowly.

The Co-operative Movement and the Agricultural Loan Fund

This movement is developing satisfactorily. Each year shows an increase in the number of societies registered, in membership and in turn-over. But all is not plain sailing and problems are arising. These problems are related to credit. Some Africans are obtaining credit, signing stop-orders and then by-passing their co-operative when selling their crops, to avoid the repayment. We have tightened up considerably and will have to do so even more. Lending from the Agricultural Loan Fund is now, for all practical purposes, limited to societies and their members. This was done to try to get more control over borrowers and for better repayment. Even this has not met the position adequately and, at the time of writing, an investigation is in hand to consider alternative arrangements which may have to be based on a community such as a kraal.

The Agricultural Loan Fund was created in the full knowledge that it would operate in a high-risk field. Even so, it is to be regretted that the attitude of so many Africans towards their obligations, after having been granted a loan, is such that they damage themselves and their fellow farmers. I do not think this is a deliberate dishonesty, but more attributable to a different outlook, and is part of the bewilderment experienced when coming into contact with the complexities of modern commerce and banking to which I referred earlier.

Rhodesia Freedom from Hunger Campaign

The campaign continued to expand during the year, its most successful effort being Well-Baby Clinics, catering for the pre-school age-group of children which, as has been found from experience, is the age-group most prone to malnutrition and its associated ailments.

This scheme started in the Midlands in 1965 and has spread rapidly to the other provinces. Some 220 such clinics in these regions were recently reported to be directly visited by some

20,000 children and their parents. Thanks to energetic local effort during the year, this scheme has become widely accepted in Matabeleland, with the African Women's Clubs largely participating. Parents mostly pay 50 per cent. of the cost of the milk powder and the protein food-stuffs which are distributed through these clinics.

The system of mobilizing the combined efforts of Government ministries and existing voluntary organizations through regional committees has resulted in a considerable diversification of projects whilst not losing sight of the necessity to introduce better farming and farming methods to ensure the production of protein goods and vegetables. The Gwelo committee is proceeding with an experimental, practical, grain-storage scheme; a number of committees have reared and distributed rabbits; and a poultry co-operative, organized by the Capricorn African Women's Clubs in the Melssetter district, bought day-old chicks, with the result that there are now some 3,000 poultry in the area, owned by individual members of the co-operative.

The Umtali committee has been active in promoting the installation of water-storage facilities, in addition to projects covering such aspects as stocking dams with fish, improved rearing of calves and cheese-making.

Buses and mobile agricultural training units provided by the R.F.F.H.C. have more than proved their value during the year. The campaign has continued its efforts to secure funds to provide two additional, much-needed units.

An effort is now being made to harness youths into the campaign and, to this end, two seminars were recently held which, it is hoped, heralds a growing involvement by youths in the activities of the campaign.

Central Library

During 1967 a Central Library to serve the Ministry was established, although it was not until January, 1968, that the first librarian was appointed. At the same time, the Ministry also took over the Microfiche Service, together with other library assets of the Agricultural Research Council of Central Africa, following its dissolution. The library staff has co-operated with the editor of the Rhodesia Agricultural Journal and, in addition, has been involved in the take-over of the Rhodesian Journal of Agricultural Research by the Ministry.

This new venture has necessitated a considerable amount of reorganization, alongside which the library staff has had to deal with an increasing demand for library services, both from officials of the Ministry and outside bodies. The first nine months of full operation indicates that a need existed for such a service. There seems little doubt that increasing pressure will be made on its services in the future, as further facilities are provided and functions previously undertaken by departments and branches become centralized.

World Ploughing Contest

In April, 1968, Rhodesia had the honour of staging the 15th World Ploughing Contest. It will be appreciated that the problems of staging this contest this year were no ordinary ones. However, due in no small measure to the drive and initiative of the Ploughing Association of Rhodesia, together with many other local organizations and individuals, and the co-operation of the World Ploughing Organization, the difficulties were overcome and the contest can only be described as a success.

In all, some 18 ploughmen, representing 10 countries, including Rhodesia, took part. Whilst conditions may not have been ideal, the high standards of ploughing attained were a tribute to the ingenuity and perseverance of the competitors involved.

First place was achieved by Mr. M. A. Th. Schoonen, of the Netherlands, who was presented with the world's top ploughing award by the Prime Minister. Mention is warranted of the achievement of Rhodesia's champion ploughman, Mr. G. J. Oliver, who tied for twelfth place in the contest. As an official in the Department of Conservation and Extension, he has done much to foster the growth of good ploughing techniques, and we are proud of his success.

Tillage Symposium

The symposium was held on the two days preceding the World Ploughing Contest and was attended not only by the visiting ploughmen but many local and overseas experts in the field of tillage research. Most people will have thought of the World Ploughing Organization as being only concerned with the very practical side of ploughing contests, but the declared objectives of the W.P.O. include the "promoting of a better understanding of the value of soil cultivation practices". It was in the light of these objectives that the symposium was held.

In all, 11 papers were presented, including six by overseas representatives. Apart from the presentation and discussion of papers, delegates had the opportunity of exchanging ideas relative to tillage problems and techniques, both in Rhodesia and overseas.

Through the support of local concerns, the proceedings of the symposium were quickly and ably printed, and distributed on a world-wide basis. Reaction to receiving the Tillage Symposium proceedings has been very favourable from overseas, and officials in this country are now reaping the benefits in the form of scientific literature relevant to our tillage research from different parts of the globe.

The symposium was undoubtedly a success and credit is due to all who made this possible.

Ministerial changes

On the 15th August, 1968, the Ministry said farewell to the Deputy Minister of Agriculture, Mr. L. B. Smith, M.P., who assumed duty as the Minister of Internal Affairs the following day. Initially appointed as Parliamentary Secretary (later designated Deputy Minister) on 5th May, 1965, his range of duties covered all the agricultural technical services, including Research and Specialist Services, Conservation and Extension, Natural Resources Board, Veterinary Services, Co-operative Societies and African Loan Fund. As chairman of the Inter-Ministry Committee Investigating Financial Aid to lowveld planters, commonly known as the Lance Smith Committee, he did much to alleviate the problems facing the planters in recent years.

The opportunity is now taken of thanking him for his outstanding support to the Ministry and wishing him every success in his new appointment.

On the 30th September, 1968, the Hon. G. W. Rudland relinquished the agricultural portfolio, due to ill health. He had been Minister of Agriculture since the 1st January, 1966, and no man could have done more for agriculture than he did during his comparatively short period in office. His constructive approach to problems, backed by a keen analytical mind and tremendous energy, led to the creation of the Farm Irrigation Fund, the Agricultural Assistance Board, the start of bulk handling installations for grain and considerable improvements in our research facilities. Be it noted that these developments contribute to the permanent advancement of our agriculture. They are

not just palliatives during a difficult period. This is some measure of the imagination and vision he brought to his task. He was truly a great Minister of Agriculture. We enjoyed working with him and valued his inspiration. All of us wish him and Mrs. Rudland well and hope that, in his new capacity as Minister without Portfolio, he will continue to help agriculture.

The Hon. D. C. Smith took up office as Minister of Agriculture on the 30th September, 1968, and we extend to him a very warm welcome. He is no stranger to agriculture and its problems, and we look forward to serving with him in the years ahead. It goes without saying that he is assured of the loyalty and devotion of the entire Ministry.

The future

If ever a practical demonstration was required of the significance and importance of agriculture in the Rhodesian economy. I submit that the past few years have demonstrated this. The state of agriculture has influenced to a greater or lesser degree the health of almost every other sector of the economy.

The industry has weathered sanctions, droughts, frosts, increasing costs, difficult marketing and little, if any, change in the price of its end products on the internal market. This has been achieved by increased efficiency, forced upon farmers more for survival than for profit. That Government has been sympathetic and constructive to the industry's problems has been practically demonstrated beyond all shadow of doubt. One has only to look at the Estimates of Expenditure for proof positive. Support for the tobacco sector; funds for drought relief; easy loans for irrigation and diversification; the expenditure for rehabilitation through the Agricultural Assistance Board; funds for capital expansion of marketing boards; funds for research, extension and control of animal health and so on, have been given within the resources of the country to provide them. Nevertheless, the strain on farmers has been, and still is, considerable.

Much has been said about the lack of profitability in farming. It must be conceded that a developing country like Rhodesia relies heavily on the proper exploitation of its natural resources to develop its economy. In other words, primary industry is of paramount importance. As far as agriculture is concerned, occupation and utilization of the land must be affected by the opportunity to earn a reasonable livelihood and achieve a

reasonable return on capital and effort invested. Clearly a "reasonable" opportunity must imply, on the part of the individual, a sound knowledge of his business and a prudence in his investments. It must imply, on the part of the state, the provision of an infrastructure which will give the opportunity. This covers a wide range and embraces marketing and pricing policies, protection of the internal market, transport and power policies, water development policies and the like. Thus the charge of lack of profitability cannot be laid at any one door. Opportunity of profit must not be interpreted as guarantee of profit. An individual must calculate the level of his investment if he desires a given rate of return on it. It is no answer for him to claim that he had to pay a certain price for a piece of land when its potential cannot possibly give him the return he wants. Perhaps he was prepared to pay a premium as a hedge against inflation. In this event, he must be prepared for a lower annual return. The balance of his reward is in a sense deferred. He has banked on getting it in the future when he realizes his investment.

On the other hand, the farmer faces certain hazards. The weather is the obvious one. It has such a tremendous impact on the level of his production and his costs. Another is the fact that for social and political reasons there is invariably a substantial lag between rising input costs and adjustments to the selling price. Another is the smallness of the internal market, which means a greater proportion going into the export markets where our products compete with those of other countries—especially the agricultural products of highly developed countries which can and do support their agricultural industries to a substantial degree.

As mentioned earlier, Government has done a great deal for our agriculture but I believe, for its stability and health and the well-being of other sectors of the economy, more is necessary. Unfortunately, everything costs money. Nor can everything be done at once. However, bearing this in mind, as well as the desirability of reducing the expensive *ad hoc* measures resorted to in times of stress, it is my opinion that steps along the lines of the following should be undertaken as and when finances permit:

Additional funds for water development

This applies for development of national schemes as well as individual schemes.

Economic water charges

Here I mean economic from the user's point of view—not from the point of view of the investment in the reservoir. After all, water is conserved for utilization. If the purpose for which the water has been conserved is not economic, then we have not really achieved much. A viable area attracts development. A subsistence one creates embarrassment, which can be costly. I suggest that if the operations of the conservation works and its distribution system show a deficit we should ask ourselves what we have bought for this sum. It may well be a thriving community contributing to the Exchequer through income tax, customs duties, sales tax and so on, plus the provision of additional employment opportunities.

Marketing depots

Transport costs are a significant feature in a farmer's economy. This position could be improved through the provision of depots in areas suitable for the production of particular crops before production-levels, in fact, warrant one. Deficits should not be met by producers but by the state as a development cost until through-put reaches predetermined levels.

Price stability

The season can affect production-levels to an enormous extent—particularly in the case of maize. In turn, this leads to marked fluctuations in price, but the price (except where pre-planting prices have been announced) is not known until the crop is about to be harvested. I do not advocate pre-planting prices, as the risk is too great. But I do suggest that a price variation should be kept within an announced range. This will, in my opinion, serve two purposes without undue financial risk. It will create stability and it will reduce the risk of transferring an under- or over-production problem from one crop to another.

Research

Government's record is a good one but we cannot afford any complacency. Research must keep ahead of practice and proper facilities are essential. We are not yet adequately equipped and the quicker we can correct this the better. Of course, research must be backed by extension and this field also needs strengthening.

Education

Knowledge of one's trade is essential for success. We do have some facilities but expansion is

necessary—not only at academic institution level but in the extension field as well. Management, i.e. budgeting, cost-control, market analysis, etc., is a field to which much greater attention and effort must be given.

Acknowledgements

I wish to acknowledge sincerely the co-operation this Ministry has received from so many quarters throughout the year. The producer organizations have discussed their problems in a frank and constructive manner. They have assisted us with advice and have helped in implementing policy.

The assistance given in drought-relief assessment and in considering applications for loans from the Farm Irrigation Fund, in particular, has been invaluable. Other ministries have been consistently helpful when their views and assistance have been sought. The statutory boards have never failed to measure up to all demands.

Finally, the loyal service of all members of this Ministry has never flagged during a most trying year, and I am deeply grateful to them.

R. A. GRIFFITH,
Secretary for Agriculture.

Economics and Markets Branch Report

for the period 1st October, 1967, to 30th September, 1968

SINCE the establishment of the Agricultural Marketing Authority, in September, 1967, the functions of marketing research and marketing policy previously devolving on the branch became largely the responsibility of that body.

The establishment of the branch was reduced by three professional economist posts, with effect from the 1st July, 1968, when all functions in farm management extension were transferred to the Department of Conservation and Extension.

At the same date, the branch assumed direct responsibility for all farm management research and took over the detailed farm analysis developed by its economists while on loan to the Department of Conservation and Extension since 1960. Three analytical staff (Administrative Assistant/Administrative Cadet grade) were transferred to the branch from the Department of Conservation and Extension to ensure continuity in existing commitments.

Field surveys

In view of the expanding number of farmers contributing to the detailed farm management analysis, greater emphasis was placed on the more general type of field survey, as opposed to specific crop or livestock enterprises. To this end, analysis was designed for computerization, in the hope of gaining greater coverage and earlier results of wider but less-refined application.

In the event, the 1966-67 general farm management survey included only 126 farm results. This is disappointing, in spite of being larger than the previous year. Computer-processing contributed almost as many problems as it resolved, and the report is available no earlier than in previous years.

Two commodity cost-of-production surveys were undertaken—

- the cost of production of single and double hybrid seed maize for the 1966-67 crop; and

- the cost of production of flue-cured Virginia tobacco for the 1966-67 crop.

Surveys relating to these two crops have been undertaken annually since 1964-65 and 1961-62, respectively, and are to be discontinued.

Plans are now afoot to direct a general survey at establishing trends in the financial state of farming, while simultaneously increasing the availability of staff for studies in depth of particular problems such as credit, diversification, transport or contractor services. The provision of farm management data will be provided on an increasing scale from the detailed farm management analysis. Limited survey work in African agricultural areas was carried on by one economist, who produced a valuable report on conditions in an irrigation settlement.

Farm management

With the reorganization mentioned earlier, greater liaison was possible between officers of the farm management research section and those engaged in other spheres of both production economics and agricultural development.

The farm management research section came under increasing pressure, and there is no doubt that the business approach to farming which has been nurtured by the branch over a number of years is now proving its value. Together with the extension service provided by the Department of Conservation and Extension and the services afforded by the Management Accounting Service of the Rhodesia National Farmers' Union, the farming community is becoming increasingly well serviced in this important aspect of farming operations.

During the year, 68 individual farm business analysis relating to the 1966-67 farming year were completed, together with the economic assessments of those analyses. In respect of the 1967-68 farming year, the number of participants increased to 86, and for the coming year the number is likely to be of the order of 120. This expansion is most gratifying, especially as the desire to contribute is coming entirely from the farmers concerned, to the extent that, since August, several prospective contributors have had to be turned away. Further expansion is essential for adequate coverage in management standards to be available to the Extension Service. This is entirely dependent on an increase in analytical staff.

In addition to the individual analyses, some 18 discussion group results were completed and

several long-term plans prepared for individual farms. The booklet *Farm management data*, relating to the 1966-67 results, was also completed, together with the publication *Tobacco management standards*.

A further important aspect of the section was the provision of farm management training courses. Two courses, each of three days, were held for African Purchase Area staff in the Victoria Province, and material was made available to these officers which would allow them to assist some 70 farmers in keeping business records. One five-day course was held for the officers of the Farm Management Extension Service of the Department of Conservation and Extension as part of their induction training, and one three-day course was held for the final-year students of Gwebi Agricultural College. In addition to the courses, several farmers' meetings were attended for the purpose of putting over the business aspect of farming. It is the intention to continue such courses and talks of this nature in the coming year.

Agricultural development

Mention has been made of the Agricultural Marketing Authority and its responsibilities. Whilst its establishment has afforded relief to the branch in certain directions, pressures have built up in others, this being especially so in the field of production economics. However, in the general field of agricultural development, officers of the branch are still committed to activities covering a broad field. These activities include such aspects as provision of intelligence reports; economic analysis and evaluation of developmental projects, with particular emphasis on their effect on the agricultural industry; provision of representatives on working parties, interministry negotiations, consultations, advisory and planning committees; advising other Government departments, statutory, public and private bodies on economic matters affecting the agricultural industry; participation in international trade aspects of the agricultural industry, import control, and educational functions.

In undertaking these varied activities, close liaison existed with other departments of the Ministry, the Agricultural Marketing Authority, other ministries, statutory boards and many other organizations in the public sector.

Staff

The branch was unfortunate to lose the services of five professional officers, one technical assistant and two clerical staff during the first eight months of the year. These departures, coupled with those which occurred towards the end of last year, meant that, out of a complement of 17 professional officers and two clerical officers, the branch lost the services of nine trained professional and two clerical staff over as many months. Recruitment problems were eased somewhat by the fact that, as from July, three economist posts were transferred to the Department of Conservation and Extension, thus enabling that department to employ three farm management extension officers. It is possibly of interest to mention that, of the nine professional officers, three took up posts with the Rhodesia National Farmers' Union, two with the Agricultural Marketing Authority, one with a local fertilizer company and one with a firm of accountants. Their experience has, to a large extent, therefore, been retained within the local agricultural industry.

Of the eight remaining vacancies, five new professional and two clerical officers were appointed during the year. In the case of the post of Chief Agricultural Economist, the incumbent of which was lent to the Agricultural Marketing Authority in September, 1967, it was not possible to fill this vacancy until such time as his status with the authority had been determined. By the year-end the position had still not been finalized.

In respect of staff, therefore, the branch suffered a most difficult year. They were under considerable pressure, to which they responded most satisfactorily.

Acknowledgements

To the many farmers with whom branch officials came into contact, officials of other branches and departments of this and other ministries, farming organizations and people from many walks of life, grateful acknowledgement is made for the willing co-operation, understanding and assistance received.

I. J. DOUGLAS,

Acting Chief Agricultural Economist.

Annual Report of the Co-operatives and Loans Branch

for the year 1968

1. INTRODUCTION

CO-OPERATIVE development includes many features in its make-up, not the least of which is education, in the broadest sense of the word, and it is in this part of the movement that the greatest accent has been placed by the staff during this year.

This activity has involved concentrated staff training for the newer Government personnel, courses for secretaries, for chairmen and for committee members of co-operative societies. Lectures have been given by the Registrar and staff to persons interested but not actively engaged as yet in the movement. These varied from economics students at the local University to African women undergoing training as community development advisers.

In spite of the drought, followed by one of the most severe winters on record, there has been a steady progress in societies and membership during the year.

In the African agricultural co-operatives alone, membership has increased from 22,543 to 24,416 and the number of their primary societies from 236 to 257.

There has also been an increase in the field of African credit unions. Three more have been registered during the year, making seven in all to date. In addition to these co-operatives, many savings clubs have been formed, and these are receiving help and education from volunteers outside the branch. When these clubs have reached a satisfactory standard of efficiency and responsibility, they will be considered for registration as credit union co-operatives. Whilst, for the moment, this part of the co-operative movement has been of more educational than economic value, if it continues to expand at its present rate it will not be long before a start can be made to plan a union or secondary society with the primary credit unions as members. In this way, savings could be centralized, and possibly eventually invested in an African central co-operative agricultural credit society (or what is often loosely termed a "co-operative agricultural bank"). If this latter society were to be formed with these and other funds, it could represent a big step forward to one of this branch's aims, namely to make

African agriculture self-supporting in the loan field from its own funds, many of which lie buried or hidden in the Tribal Trust Lands and thus are of little use to anyone.

From the 26th July to the 12th August, 1968, the Registrar was honoured with an invitation to attend a conference in Angola upon co-operatives and community development. Copies of co-operative legislation and training booklets used in Rhodesia were supplied to delegates from Angola, Moçambique and South Africa, by request.

2. PROGRESS

(A) General Information

(i) *African societies*

Marketing figures fell this year very considerably, due to the poor wet season followed by severe cold and heavy frosts.

The five co-operative unions, which have a total membership of 146 primary societies, functioned according to plan. Three more unions are due for formation in early 1969. The Sabi Valley and Umtali Union, however, is suffering from lack of member support, partly due to the drought and consequent lack of water for irrigation purposes, and partly due to members' refusal to comply with conditions of farming irrigation plots laid down for them by the Ministry of Internal Affairs. The Central Mashonaland Union, on the other hand, in its first year handled £302,800 with few difficulties—a most impressive performance.

The Housing Co-operative in Bulawayo appears to be carrying out its task satisfactorily, and thanks are due to the Bulawayo Municipality for its assistance in this venture. Two marketing and agricultural supply societies amalgamated during the year to reduce overhead costs of administration.

(ii) *European societies*

Two European marketing and agricultural supply societies were liquidated during the year, leaving five of such societies functioning for the benefit of members, and two more in existence but not active.

Paragraph 3 (B) of this report gives a comparison with last year's figures and Annexure B shows the development in the societies engaged in these agricultural activities since 1964, which was the first year European agriculture came back under the Territorial wing from Federal administration.

(iii) Categories of registered societies

The following is a list of the types of societies registered under Chapter 225 and functioning as at 31st December, 1968:

African marketing and agricultural supply societies	257
Indian thrift and loan societies	2
African Marketeers Society	1
African Housing Society	1
European marketing and agricultural supply societies	7
European Potato Marketing Society	1
European Honey Society	1
Rhodesia Cotton Growers Society	1
African credit unions	7
African co-operative unions	5
	283

(B) Marketing

Of the 257 African marketing and supply societies, 53 failed to market any produce, though they assisted farmer members in other ways. The remaining 204 societies marketed as follows:

Produce	Sacks
Maize—Grade A	45,943
B	9,014
C	1,105
D	81
Shelled ground-nuts—A	39
B	4,868
C	55
Sorghum—A	2,211
B	1,688
C	601
D	206
Munga	734
Sunnhemp	148
Sunflower	222
Beans—Soya	22
Sugar	656
Ration	80
Rapoko	65
Wheat	5,769
Potatoes	931
Maize-meal	982
Unshelled ground-nuts	434
	75,854
Seed beans (108,310 lb. at 112 lb. per sack)	967
Green peas (167,153 lb. at 200 lb. per sack)	836
	77,657

Burley tobacco	196,814 lb.
Greenleaf tea	25,471 lb.
Coffee	7,463 lb.
Pea seed	1,281 lb.
Seed lettuce	9,481 lb.
Seed tomatoes	216 lb.
Onions	980
	241,706 lb.
Cotton—Class A	4,274,347 lb.
B	946,971 lb.
C	192,009 lb.
Unclassified	95,576 lb.
	5,508,903 lb.

202 lb. of poultry were also marketed.

In addition, the following livestock was marketed:

Cattle—Grade:	Head
Chiller	87
GAQ	709
FAQ	686½
Compound	323
Inferior	103½
Rejects	4
Condemned	12
	1,925
Sheep	115
Pigs	555
Goats	251
	921

The number of livestock marketed is 1,123 head more than last year, and it is pleasing to note that so many more this year are in the higher grades.

The above represents the total produce marketed by 204 societies with 21,141 members, and gave a crop and livestock turnover of £394,032, a decrease of £428,988 over last year's figures due to the poor season experienced.

African societies issued 84,722 sacks to their members, at a total value of approximately £9,750, and hired transport for the marketing of members' produce and for the cartage of supplies, at the cost of £31,840.

Produce marketed by African societies in 1968 was graded as follows:

Grade A	48,193 sacks
B	15,570 sacks
C	1,761 sacks
D	287 sacks

The following figures show the quality of produce, in percentage of grades, by African societies since 1959:

	GRADE					
	S	A	B	C	D	X
1959	%	%	%	%	%	%
1960	—	67.00	32.60	.40	—	—
1961	—	91.52	8.01	.47	—	—
1962	—	72.99	21.11	5.89	.01	—
1963	0.20	67.00	26.76	6.04	—	—
1964	2.15	71.50	24.92	1.43	—	—
1965	1.38	87.17	9.90	1.55	—	—
1966	.12	91.07	7.77	.82	—	.22
1967	2.86	59.00	29.36	4.98	3.80	—
1968	—	45.52	39.71	11.70	3.07	—
1968	—	73.25	23.65	2.67	.43	—

Grain grading courses were once again held for staff and society officers in regions where co-operative marketing was planned through African buying officers.

The above table shows a very considerable improvement in the grades of produce marketed over last year's figures.

(C) Supplies

Through cash, drought-relief and short-term loans, the following have been purchased by members through their societies in 1968:

Fertilizer	£149,108
Seed	£35,337
	£184,445

These figures show an increase of £48,280 over last year's figure of £136,165.

Also by means of cash, drought-relief and medium-term loans, members have purchased through their societies agricultural equipment to the value of £49,661. This figure represents an increase of £14,853 on last year's figure of £34,808. This is accounted for to a certain degree by drought-relief measures instituted by Government in African Purchase Areas, but it also reflects that the African farmer is not deterred from improving his agricultural methods by a very bad season.

3. DETAILS OF CO-OPERATIVE SOCIETIES REGISTERED UNDER CHAPTER 225

(A) African Marketing and Agricultural Societies

There were 257 African marketing and agricultural supply societies functioning under Chapter 225 in the year of 1968. The areas in which they operated were as follows:

53 in Purchase Areas
183 in Tribal Trust Lands
19 in irrigation settlements in Tribal Trust Lands
2 in Unreserved and mission land

257

Statistical details of these societies, in provinces and regions, are as follows:

Province and region	Number of societies	Member-ship	Share capital	PRODUCE AND LIVESTOCK MARKETED						Cash handlings
				In bags	Cotton (lb.)	Seed and bean crops (lb.)	Livestock (head)	Other crops		
								Crop	lb.	
			£							£
SALISBURY										
Salisbury	16	1,522	2,045	4,187	28,394		499	Burley tobacco . .	14,076	82,393
Salisbury S.W.	16	2,338	3,594	42,903	464,373		34	Burley tobacco . .	48,977	153,586
Salisbury N.E.	15	3,327	3,327	3,940	580,163		13	Burley tobacco . .	105,022	65,035
Darwin	10	1,390	1,632	4,363	49,599					32,654
VICTORIA										
Victoria West	16	1,493	2,223	1,325	3,242		188			17,475
Victoria East	18	2,030	2,471	789	104,261		357			25,936
Victoria South	9	704	836	119	32,913		26	Onions	980	6,949
GWELO										
Gwelo Central	14	738	972	1,339						4,526
Que Que	18	1,555	2,182	2,856	1,972,619					97,183
Shabani	14	1,369	1,519	121						8,232
Enkeldoorn	26	1,822	2,386	4,078	22,673	3,954	32	Burley tobacco . .	11,827	23,981
UMTALI										
Umtali	10	836	1,195	33	105,355	4,348	395	Green peas	167,153	67,625
								Greenleaf tea	25,471	
Umtali South	13	1,211	2,379	943	1,029,521	42,421	88	Coffee	2,002	
Rusape West	9	887	1,038	549	2,096		135	Coffee	5,461	82,971
Rusape East	12	1,092	2,020	1,816	1,096,273	68,565	133	Burley tobacco . .	16,912	10,455
										74,767
BULAWAYO										
Bulawayo North	15	675	914	1,407			485			11,485
Bulawayo West	19	863	1,018	1,129			461			9,599
Gwanda	7	564	564	3,957	17,421					18,185
TOTALS	257	24,416	£32,315	75,854	5,508,903	119,288	2,846		397,881	£793,037

Statistical details of each society (in schedule form and grouped in regions) are available in the head office of this branch, subject to certain conditions. Similar schedules will also be available under like conditions for those societies grouped under paragraphs 3 (B) and 3 (C) and for co-operative companies grouped under paragraph 4 of this report.

(B) European marketing and agricultural supply Societies

Total statistical details of European marketing and agricultural supply societies for the year 1968 are as follows:

<i>Number of societies</i>	<i>Membership</i>	<i>Share capital</i>
10	617	£5,788

The above figures, in comparison with those of 1967, show an increase of 40 farmer members and £20 in share capital.

As these figures are for one less society than last year, they indicate that this side of the movement is at least "holding its own" in difficult times.

(C) Societies for purposes other than agriculture

Total statistical details of societies registered both by the Indian and African communities for purposes other than for agriculture are as follows:

<i>Number of societies</i>	<i>Membership</i>	<i>Share capital</i>
11	891	£37,855

The above figures, in comparison with those of 1967, show an increase of 27 in membership and £84 in share capital, three more societies having been registered.

(D) Co-operation unions

The following unions are registered and functioning:

<i>Reg. No.</i>	<i>Name</i>	<i>Members-ship</i>	<i>Share capital</i> £
190	South Mashonaland Co-operative Union Limited	43 socs.	1,165
207	Sabi Valley and Umtali Co-operative Union Limited . . .	7 socs.	275
238	Enkeldoorn Central Co-operative Union Limited	26 socs.	510
242	Sebungwe Co-operative Union Limited	17 socs.	370
262	Central Mashonaland Co-operative Union Limited . . .	53 socs.	2,205

N.B.—No cash handling figures have been included in these statistics, as they are already recorded society by society in other schedules, and accounted for under regional figures given in the table in paragraph 3 (A).

4. DETAILS OF CO-OPERATIVE COMPANIES REGISTERED UNDER CHAPTER 181

<i>Number of companies</i>	<i>Membership</i>	<i>Share-capital</i>	<i>Cash handlings</i>
18	9,178	2,062,003	£16,668,230

One company for marketing fruit was registered during the year, and the Mashonaland Cattle Co-operative Company Limited changed its name and its coverage to the Rhodesia Cattle Co-operative Company Limited. A further company, for which information is not available, has applied for voluntary liquidation, and statistics concerning this company have been excluded from the above.

The above figures, therefore, show no change in the number of companies, and increases over 1967 of 667 in membership, £82,267 in share capital and £1,622,218 in cash handlings.

5. LOANS

Time, together with poor seasons in some areas, is showing that African marketing and agricultural supply societies are not proving to be such a successful instrument as was at one time hoped, through which to supply Government loans to African farmers, both in the Tribal Trust Lands and in the Purchase Areas.

Whilst the African farmer is basically honest about admitting his loan liabilities, he tends to draw up his own priorities upon the income he derives from his crops, and loan repayments are usually the last priority on his list. If the co-operative exerts its right of lien over the crops he markets through his society, he tends to object, and to refrain from marketing through his society, to his own financial detriment as well as to that of his society.

Plans are now being made to change the method of loan repayment, and it is hoped to create some pilot schemes in 1969 to prove in the field the theoretical decisions arrived at over the conference table.

In the meantime, officers of the branch are conducting a loan repayment drive, which has met with considerable success to date, in spite of the appalling season just experienced. This is not, however, a very desirable procedure, since the African farmer is tending to regard the officers of this branch as debt-collectors, and not as extension officers in the field of co-operative economic development.

If the coming season produces a good crop yield it is hoped to reduce the outstandings considerably. Nevertheless, in spite of extreme care in the granting of these loans, and even taking into consideration some bad seasons involved during the 12 years concerned, the picture is not altogether a happy one in the African agricultural loan field. It must be recorded, however, that co-operative societies have not written off any loans as bad debts to date; and families or heirs have voluntarily shouldered the outstandings due by their deceased relatives in many instances.

6. STAFF AND ESTABLISHMENT

Details are tabled in Annexure D to this report. Decentralization to all five provinces was completed at the end of 1967, and after a full year it is satisfactory to be able to report that this move has proved entirely successful.

Due to extreme pressure of work in the Salisbury Province, one more European co-operative officer was taken on to release the senior of the Co-operative officers from regional duties to take over the supervision of the field work of all four regions in the province. This, in turn, allowed the Principal Co-operative Officer to spend more time on planning and developing the Central Mashonaland Co-operative Union Limited—a huge organization which embraces the activities in bulk handling of supplies and marketing accounting for all the 53 primary co-operatives in Mashonaland.

It is with deep regret that the sudden death of a European co-operative officer in Umtali must be recorded.

Two European assistant inspectors of co-operative societies were taken on to fill the existing vacancies during the year, and inspectional and tuitional work in the book-keeping field of African societies has been greatly accelerated thereby. This is already having a beneficial effect on the financial affairs of societies, and more and more time must be found for further education in this sphere in the coming year.

The staff is again to be congratulated for patience and tolerance in the field, and for the long hours put in during the past year. The implementation of drought-relief for co-operative society members in Purchase Areas put a great strain on the small European staff available to undertake this task. It is greatly to their credit that the exercise was carried out so expeditiously. African staff

showed a marked improvement in their approach to their duties in 1968, but there is still a great deal of room for further improvement. To this end, provincial and co-operative officers are in 1969 planning extensive advanced training courses for co-operative assistants. There can be no condonation of low standards in this economic field of African development.

7. GENERAL

Annexure A to this report provides a year-by-year comparison of figures of African marketing and agricultural supply societies since the inception of the movement in 1956. Annexure C gives a year-by-year comparison of some figures of societies registered since 1959 for purposes other than agriculture.

One of the interesting features of this year's work has been the joint effort by this branch and the Ministry of Internal Affairs to motivate food production by plottolders on the irrigation schemes in Matabeleland. This branch has taught the co-operatives to handle the supply, marketing and accountancy side of the projects, and the Ministry of Internal Affairs, through its district commissioners and irrigation project managers, has handled the legal and administrative side of the exercise, with the Department of Conservation and Extension supplying the technical advice. So far, the results of the joint effort have been sufficiently encouraging for this branch to open a regional office in Gwanda, so that the Bulawayo South Regional Officer, who was previously stationed in Bulawayo, could thus be better situated to administer the co-operatives on these irrigation schemes in the lowveld.

The increased coverage of banking facilities in the rural areas by means of "Land-Rover" banks is to be applauded. Africans in the tribal areas are gradually awakening to the need for opening savings banks, and this branch is assisting in this educational move to the full. Furthermore, society secretaries can now, in many cases, deposit money locally, thus reducing risks of loss and theft incurred on long journeys to centrally situated branches of banks. The itinerant banking system also enables cash to be paid for produce at society level more quickly than previously, and at regular intervals.

A pilot grain storage scheme has been started at Sogwala Co-operative, in the Lower Gwelo Tribal Trust Land. If this experiment is successful it could greatly reduce the price of maize to local

consumers in times of drought or food shortage. The society purchased 375 sacks of maize in its first trial period and is now reselling to its members. Other co-operatives are assisting, where there is a shortage of food, by supplying maize-meal in bulk to their members for cash. This is not the first time that societies have performed this valuable service for their members.

The Sebungwe Co-operative Union is to be congratulated on building its own offices and warehouse in the industrial area at Que Que. It has also put up its own servants' quarters, installed a telephone and is learning to stand on its own feet financially. It will be handling between £40,000 and £50,000 worth of loans for cotton production in this growing season.

Salisbury Province continues to show an increase in cattle and cotton marketing. In 1967, 371 head were marketed; this figure increased to 537 in 1968. Also in 1967, 464,680 lb. of cotton were marketed, but in the current year 1,111,206 lb. were handled by societies.

A very close liaison was kept by all officers of this branch with officials of the Ministry of Internal Affairs and the Department of Conservation and Extension.

Finally, it is desired to place on record the grateful appreciation of this branch for all the assistance given to the staff by provincial commissioners, district commissioners, district officers, provincial conservation and extension officers, group officers, agricultural extension officers, and their African staffs, banks, Grain Marketing Board officials, transport contractors, railway officials, and all those persons who supply equipment, seed, fertilizer, sacks and services to societies, and to all those administrative and accounts officers of the Ministry of Agriculture who have assisted in the smooth running of the branch during a most difficult year, agriculturally speaking.

R. J. DINNIS,
*Under-Secretary,
Co-operatives and Loans Branch, and
Registrar of Co-operatives.*

ANNUAL STATISTICS
AFRICAN CO-OPERATIVE SOCIETIES REGISTERED UNDER CHAPTER 225
FOR MARKETING AND AGRICULTURAL SUPPLIES

	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968
Registered societies in operation	2	6	12	14	21	38	52	67	110	169	213	236	257
Buying depots	4	11	22	26	27	78	130	167	226	301	429	507	479
Membership	187	398	765	1,206	1,830	3,460	4,897	6,280	8,937	14,742	19,342	22,543	24,416
Share capital	£374	£806	£1,540	£2,440	£3,646	£6,356	£8,409	£10,186	£13,549	£20,358	£26,017	£30,514	£32,315
Crops marketed (standard bags)	—	16,354	18,569	30,607	26,813	105,309	111,590	64,992	64,856	120,307	297,244	381,085	75,854
Cotton marketed (woolpacks)	—	—	—	21	15	527	952	1,771	3,112	7,881	10,576	15,554	17,215
Cash handled	£421	£31,478	£35,077	£55,580	£71,987	£220,529	£253,140	£202,058	£316,483	£629,466	£922,322	£1,142,267	£793,037
Reserve fund	—	£106	£147	£401	£569	£2,026	£3,757	£4,814	£5,551	£7,910	£12,788	£13,942	£17,275
Sacks issued	—	17,848	20,897	31,532	27,532	106,377	120,933	77,101	66,500	171,352	300,409	513,133	84,722
Value of fertilizer purchased	—	—	£2,160	£7,314	£7,849	£13,607	£7,593	£7,463	£48,168	£111,672	£119,037	£116,719	£149,108
Value of seed purchased	—	—	£292	£2,486	£4,672	£5,673	£4,493	£4,735	£10,790	£21,100	£22,066	£19,446	£35,337
Value of agricultural equipment purchased	—	—	£88	£512	£4,586	£18,335	£23,346	£18,822	£41,569	£52,675	£29,669	£34,808	£49,661
Livestock marketed (head)	—	—	—	—	—	—	—	—	112	1,859	1,192	1,723	2,846

ANNEXURE B

EUROPEAN CO-OPERATIVE SOCIETIES REGISTERED UNDER CHAPTER 225
FOR MARKETING AND AGRICULTURAL ACTIVITIES

	1964	1965	1966	1967	1968
Registered societies in operation	5	9	11	11	10
Membership	189	332	480	577	617
Share capital	£465	£2,599	£4,242	£5,768	£5,788

ANNEXURE C

CO-OPERATIVE SOCIETIES REGISTERED UNDER CHAPTER 225
FOR PURPOSES OTHER THAN FOR MARKETING

	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968
Registered societies in operation	2	3	2	3	5	5	7	8	8	11
Membership	342	523	91	111	309	213	340	528	864	891
Share capital	£9,171	£10,845	£9,550	£11,632	£38,864	£37,036	£35,901	£34,955	£37,774	£37,855

CO-OPERATIVES AND LOANS BRANCH
MINISTRY OF AGRICULTURE
AS AT 31st DECEMBER, 1968

ANNEXURE D

STATIONS

HEAD OFFICE

Under-Secretary and Registrar

Deputy Registrar

Assistant Registrar

Inspector of Co-operatives

Assistant Inspector of Co-operatives

Administrative Officer

Administrative Assistant

Principal Co-operative Officer
BULAWAYO

Co-operative Officers

Bulawayo
West

Bulawayo
North

Bulawayo
South (Gwanda)

Principal Co-operative Officer
FORT VICTORIA

Co-operative Officers

Fort Vic.
West

Fort Vic.
South

Fort Vic.
East

Principal Co-operative Officer
UMTALI

Co-operative Officers

Rusape
West

Rusape
East

Umtali
South

Umtali

Principal Co-operative Officer
GWELO

Co-operative Officers

Gwelo
Central

Que Que

Enkeldoorn

Shabani

Principal Co-operative Officer
SALISBURY

Senior Co-operative Officer
Co-operative Officers

Salisbury
S.W.

Salisbury
N.E.

Salisbury

Darwin

SUMMARY OF STAFF

European staff

- 1 Registrar
- 1 Deputy Registrar
- 1 Assistant Registrar
- 1 Inspector
- 3 Assistant Inspectors
- 1 Administrative Officer
- 1 Administrative Assistant
- 5 Principal Co-operative Officers
- 19 Co-operative Officers
- 3 Assistant Co-operative Officers
- 1 Stenographer
- 17 Lady Clerks (two part-time)

African staff

- 8 Assistant Co-operative Officers
- 70 Co-operative Assistants
- 5 Office Orderlies

Annual Report of the Director of Research and Specialist Services

for the year ended 30th September, 1968

THE year has been one of considerable improvement in organization, staff conditions and staffing, and of research facilities. This has been due very largely to the more generous provision of funds from both Revenue and Loan Votes.

Following discussions on the du Plessis report and decisions taken on various proposals for commodity research, it was possible to implement and improve departmental structure during the year. For policy and administrative control purposes the Department is now divided into two parts, Production Research and Specialist Research, and, for purposes of scientific guidance and control, into seven branches. The layout of this report reflects this new organization for the first time.

The Department continues to be responsible for research into problems connected with all classes of livestock, of crops (except tobacco), horticulture, soil fertility problems, pests and diseases of plants. It also provides certain services to farmers and associated organizations, and to promote its own research programme: for example, seed and plant phytosanitary control and inspection, seed services, soil, plant and feed-stuffs analyses, milk recording, meat grading, botanical identification and economic intelligence. Notwithstanding the branch structure, the Department has stations sited in the different ecological regions, as defined by soil type and climate, so that the results of research are applicable locally. There are six research stations and seven experimental stations for this purpose.

The staff position improved generally as a result of the vocational bursary scheme and, to some extent, due to an improvement in salaries and grading structure. However, it is still difficult to recruit research workers in certain disciplines. Two senior officers retired during the year and there were eight resignations from the professional ranks, including two seniors, but 25 professional recruits were taken into the Department. The absorption of Agricultural Research Council personnel and projects was completed and three members of the Tobacco Research Board staff were taken over when that board had to reduce its establishment.

During the year the following members of staff obtained higher qualifications: A. A. du Toit,

M.Sc. (London), in Analytical Chemistry, with distinction; W. J. Morris, M.S. (Davis); S. W. Nelson, M.S., Ph.D. (North Carolina); and B. H. Walker, M.S., Ph.D. (Saskatoon).

The expenditure of capital funds to provide or increase research facilities occurred mainly at Chiredzi Research Station, which is in its second-last year of development, at Gatooma Research Station on new offices and laboratories, at Chibero and Gwebi Colleges to increase the student intake, and on two temperature-controlled greenhouses at Salisbury Research Station. Other capital funds were spent on providing irrigation facilities at three research stations and on farm buildings.

Liaison with farmers was improved during the year by the establishment of joint committees on cotton research and for Grasslands Research Station, while the four existing committees continued to provide a useful forum for discussion of mutual problems.

The serious and urgent problems of veld degradation in the southern lowveld were highlighted by the report of the Marginal Land Use Committee, and this Department prepared itself to start work in this field whenever the necessary finances become available. The Tuli Experiment Station, which had been taken over by the Ministry of Internal Affairs, is not a convenient or representative site for this work, and a thorough search for a better site was undertaken and completed during the year.

Conferences, study tours and official visits outside Rhodesia by staff of the Department become increasingly important to the progress of research. Visits made during the year by staff, in some cases as periods of duty while on leave, included the following:

- Mr. J. C. Raath, Director, to South Africa for S.A.R.C.C.U.S.
- Mr. P. A. Donovan, Assistant Director, to United States for International Citrus Conference, and to Portugal and Angola for research contacts.
- Dr. D. H. Saunder, Assistant Director, to South Africa for Agricultural Education Conference, and to Malawi and Botswana for red locust meetings.
- Dr. T. H. Vorster, Chief of Animal Production, to South Africa for S.A.R.C.C.U.S., animal production meeting and meat grading.

- Dr. O. West, Chief of Botany and Ecology, to South Africa and Moçambique for S.A.R.C.C.U.S. and grassland meetings.
- Mr. G. W. Herd, Chief of Plant Protection, to United Kingdom and Portugal for International Plant Pathology and Cereal Rust Conferences, and to Malawi on coffee diseases.
- Mr. R. G. Thomas, Chief of Chemistry and Soil Science, to South Africa on fertilizer matters.
- Mr. K. E. Cackett, Officer in Charge, Lowveld Research, to South Africa on rice and horticultural production matters.
- Mr. F. Gillingham, Chinchilla Specialist, to United States, Canada and South Africa on chinchillas.
- Mr. H. Ward, Officer in Charge, Makoholi, to Australia and New Zealand on animal and pasture matters.
- On crop production: Mr. I. B. Edwards to South Africa, and Dr. F. E. M. Gillham and Mr. J. R. Tattersfield to Moçambique.
- On botany: Mr. R. B. Drummond to United Kingdom, Belgium, Portugal and Moçambique, Miss Grosvenor to United Kingdom, Mr. T. Muller to South Africa and Mr. B. K. Simon to Zambia and United Kingdom.
- On entomology: Dr. S. Broodryk and Mr. M. J. Hardcastle to South Africa.
- On chemistry: Mr. A. A. du Toit to South Africa.
- On meat grading: Mr. J. J. Clemenshaw, Mr. H. J. Farrell, Mr. H. Barrett and Mr. F. F. Buxton to South Africa.

BRANCH OF ANIMAL PRODUCTION

The year has been an extremely difficult one, particularly for producers in Mashonaland, who suffered one of the worst droughts for 20 years; special state relief measures were introduced to keep some producers on the land. The position in Matabeleland was less severe, where grass growth in most areas was better and, on the whole, producers did reasonably well.

The beef industry

The possibilities of expanding the production of store cattle are limited because existing systems of young stock production result from a past price policy designed to encourage the fattening of bullocks in the cropping areas for slaughter in the off-season. With the change in consumer preference from fat to lean meat, this demand has been greatly reduced and, where possible, breeders will be well advised to produce stock for direct slaughter.

Research

At Matopos Research Station, in a study in which selection for increased beef production is being practised in closed grade Africander herds on two planes of nutrition, the effects of feeding

on growth-rate have been found to be cumulative. The male progeny of cows fed during the dry season, and which themselves are fed during the subsequent dry season, can be slaughtered off the veld in May at the age of 28 months, and have weighed, on the average, 1,124 lb. If such production became general, however, it would increase the seasonal glut of slaughter stock in May. It is, therefore, proposed to investigate a production method in which steers weighing 720 lb. in May will be fed a protein-rich supplement at a level above maintenance from May until August, and will then be fattened in pens for a period of 90 to 100 days. Such animals could be slaughtered at the age of 24 months at a weight of 1,100 lb.

The increase in the growth-rate of heifers with feeding has been such that they can be bred at the age of two instead of three years. The progeny born of heifers at two years of age weighed 70 and 505 lb. at birth and weaning, respectively. Their weights did not differ significantly from those of the progeny of heifers bred at three years of age, namely, 72 and 490 lb., respectively.

A comparison was made of weaning early in the dry season and late in the dry season at two levels of nutrition, veld grazing with protein-rich supplements and veld grazing only. In both cases calves which were weaned late were found to grow faster than those weaned early, and this advantage was maintained during the subsequent growing season. A finding of particular interest is that to maintain similar growth in the cow and calf unit the late-weaned groups required 60 per cent. less feed than the early-weaned groups.

Pilot experiments were initiated to study the effects on growth and body composition of feeding or withholding protein-rich supplements to growing beef cattle during various dry seasons over their three-year life.

At Henderson Research Station the technical feasibility of developing complete diets for *ad lib.* feeding to cattle (dairy cows and calves and beef cattle) has been the central theme of a number of investigations that have either recently been completed or are still in progress. One of these included the use of by-products of the sugar industry by beef cattle and may have some application in the lowveld. Supporting these studies on applied nutrition has been more detailed research into such aspects as the physiological effects of high-grain diets on ruminants, and dietary and physiological factors affecting voluntary food intake by cattle and sheep.

At Grasslands Research Station the emphasis of the year's work hinged on the efficient use of the maize plant for the production of beef. The *ad lib.* feeding of milled mature maize plant, 1 lb. crude protein and 40,000 I.U. Vitamin A to steers in the dry season resulted in daily liveweight gains of 2½ lb. or more.

Research on autumn calving is encouraging. Ninety per cent. of the cows calving in 1967 calved again in 1968, and the male calves dropped in March-April, 1967, were ready for slaughter after a 95-day feeding period in the 1968 dry season.

The Manguni breeding programme continued very successfully at Tjolotjo Experiment Station, in spite of less than 15 inches of rain. The demand for breeding stock increases, and consideration is to be given to an annual auction.

The Dairy Industry

The production of milk continued to increase, despite the drought. This can be attributed to new producers entering the fresh milk trade and increases in yield from existing herds. The average lactation yields of milk-recorded herds increased from 7,305 lb. in 1966 to 7,640 lb. in 1967.

There was also a satisfactory improvement in milk quality. Eighty per cent. of the milk samples tested for solids not fat satisfied the legal standard of 8.5 per cent., compared with 73 per cent. of samples in the previous year.

Butterfat intake continued to increase and butter manufacture was at a record level. Eighty-seven per cent. of butterfat received qualified for first-grade quality. Similarly, the sales of all varieties of cheese improved by 8 per cent. over the previous year, and 97 per cent. of the cheddar cheese qualified for the first grade.

Research

At Matopos Research Station, in an initial calf-rearing experiment, it appears that abrupt weaning at the age of five weeks can be done successfully, provided that the rumen development can be stimulated at this early age.

At Grasslands Research Station, work on the use of maize in dairy rations indicated that the milled mature maize plant gave milk yields as high as those obtained with silage.

The sheep industry

From a production point of view, there has been no improvement in the ratio of lambs to mature stock slaughtered or in the number of carcasses in the different grades, i.e. 44 per cent. of the slaughterings were lambs, while the majority of carcasses in the lamb and mutton classes were grade 2.

Research

Comparatively little is known of how body composition of ruminants is affected by diet. This subject has been investigated in a number of studies at Henderson Research Station with immature and mature sheep, using a comparative slaughter technique. Total body composition was determined, and changes in composition of gains and losses of body weight were ascertained during different phases of growth.

At Grasslands Research Station, a nematode survey, conducted during the year with undosed sheep, showed that wire-worm, which was present throughout the year, contributed 81 per cent. of the parasite burden.

The pig industry

Investigations are being carried out at Chibero College on the performance of the indigenous pig. The main part of this work is concerned with measuring the effects of nutritional level on reproduction in the female.

The poultry industry

The formation of the Rhodesia Poultry Producers' Association after months of negotiations can be regarded as one of the most important steps towards the establishment of an organized poultry industry. The registration of poultry producers and the rendering of statistical returns are already proving to be of inestimable value in the planning of production and marketing of poultry and poultry products.

The fourth and fifth egg-laying trials gave excellent results, and to further improve the breeding value of laying stock additional accommodation has been provided for the sixth laying test.

Research

To reduce production costs, research on the nutrition of poultry was continued. With the expansion anticipated in the production of cotton,

special attention was given to the possibilities of increasing the amounts of cotton-seed meal in poultry rations.

The chinchilla industry

The improvements made in chinchilla production over the past few years is noticeable and breeders have been issued with a guide giving standards of excellence.

A Chinchilla Pelt Marketing Board has been established to ensure that all pelts for export are of a suitable quality. Chinchillas and chinchilla pelts are now designated as "agricultural produce" and regulations for the registration of all producers will be introduced, effective from 1st December, 1968.

Research

The Chinchilla Breeders' Association approached the Department on the subject of research, and investigations are to be made into the needs and priorities, particularly on the problems of fur-chewing and nutrition.

BRANCH OF BOTANY AND ECOLOGY

Botany

A list of the flowering plants and ferns of Rhodesia is in the course of preparation. The list will include some 5,000 species and will expedite the completion of the following projects in hand:

Trees of Rhodesia; African plant names; weeds of Rhodesia; poisonous plants.

Two further volumes of the *Flora Zambesiaca* are in press, the Pteridophyte volume produced by Dr. Schelpe, of Cape Town, and the Mimosoideae volume by Mr. Brennan, of Kew. At Salisbury, work has continued on the Rubiaceae, Setaria and Sacciolepis. *Kirkia*, Volume VI, parts 1 and 2, were published during the year, under the joint editorship of Professor Wild and the Chief Botanist.

National Botanic Gardens

Considerable progress has been made during the year in making the National Botanic Gardens more parklike by the removal of rocks and by grass-planting. Many more indigenous trees and shrubs have been planted.

Ecology

The severe drought over much of the country, and particularly the southern lowveld, again resulted in a lack of grass and stock-water. The failure of the grass crop has borne out previous warnings that even an exceptionally good rainy season such as that experienced during 1966-67 is not sufficient for perennial grasses to establish on areas denuded by overstocking.

One beneficial effect of the frost was to kill back numerous woody species, and to provide an opportunity to control bush, particularly when followed by burning or by using chemical or mechanical methods.

During the year, the controversy over the advantages and disadvantages of the high-intensity, short-duration system of grazing resulted in an unprecedented increase in interest in veld management from which only good can come.

Staff conducted numerous surveys to assess the condition and trend of vegetation, to advise on management requirements and assess land-use capabilities, requested by the Natural Resources Board and the Department of Conservation and Extension. Surveys were also made for the Department of National Parks and Wild Life Management in the Wankie, the Kyle and Inyanga national parks, and in the Mana Pools, Chiwoire, Tuli Circle and Gona-re-zhou game reserves.

Important visitors during the year included Dr. C. G. M. Tidmarsh, of the Department of Agricultural Technical Services, Pretoria, and Professor A. J. Pienaar, University of Pretoria, to see and discuss the pasture research work and the application of grazing management, including high-intensity, short-duration grazing on farms and ranches, and Mr. E. V. Komarek, of Tall Timbers Research Station, Tallahassee, Florida, U.S.A., who is a world authority on the ecology of fire.

Research

At Matopos Research Station, in trials to determine the effect of clearing trees on the growth of grass, the yields of grass on cleared plots were again very much greater than on plots left undisturbed. The greatest increase with clearing was at Tuli, where only nine inches of rain fell during the season. Yields of herbage on the undisturbed and cleared plots, respectively, were 220 and 1,120

lb. dry matter per acre. In addition, weeds comprised 68 per cent. of the herbage on the undisturbed plots, whereas all the herbage on the cleared plots was grass.

Recent transect measurements at Tuli, in woodland which was ring-barked on a field scale in 1966, show that two-thirds of the trees *Colophospermum mopane*, *Commiphora mollis* and *Acacia fleckii* are dead or severely affected, but that only one-third of the *Combretum apiculatum* trees have been similarly affected. The initial ring-barking at Tuli required only one man-day per acre, while the first and second removals of coppice growth required one-third and one-eighth man-days per acre, respectively. At Tjolotjo, the cost of ring-barking and pulling the coppice twice on dense Gusu woodland has been only 4s. per acre.

In a pilot trial with goats on cut-over Gusu woodland at Tjolotjo it has been found that goats browse heavily on all the common tree species except *Baikiaea plurijuga*.

A grazing trial has been started at Matopos Research Station to compare two multi-paddock systems in which the stocking-rate is one steer to seven acres with the three-herds-to-four-paddocks system in which the stocking-rate is one steer to 13 acres. Each of the multi-paddock systems involves 12 paddocks to one herd; in one, the principle of quick-graze-long-rest is applied, while the other is based on the principle of complete-graze-long-rest. In a supplementary trial the effects on the veld of grazing at stocking-rates of 5, 7, 9 and 11 acres per steer in the quick-graze-long-rest system is being assessed.

At Nyamandhlovu, a one-herd-to-four-paddocks system is being compared with a sixteen paddocks to one herd quick-graze-long-rest system. The stocking-rates are one cow-and-calf unit to 19 and 14½ acres in the four-paddock and sixteen-paddock systems, respectively. At this early stage, no proper assessment of the multi-paddock systems is possible, but there are indications that the quick-graze-long-rest system might well prove a useful means, especially on thornveld, of safely increasing stocking-rates beyond presently recommended levels. Where stock have been forced to graze all the available grass closely, as in the complete-graze-long-rest system at Matopos, steer gains have been greatly reduced, even when a protein-rich supplement is fed.

At Grasslands Research Station, the very dry season affected all grazing and cutting trials.

Weight gains of steers on veld were lower than usual and were still further reduced by rotational grazing as opposed to set stocking.

BRANCH OF CROP PRODUCTION

Seed maize production, though reduced by drought, will prove adequate to meet the country's requirements. Cotton production will certainly be the highest on record, and the yield of seed cotton per acre will probably be higher than in any season, except the previous year's record, achieved under much better rainfall conditions. The yield of winter wheat is likely to be a record from an acreage that has again increased dramatically. The climatic conditions were most favourable for wheat, and this, combined with the availability of improved varieties and the absence of rust, will account for the high yields.

The remarkable achievements by crop producers under the season's adverse climatic conditions is an indication of the higher standards of agronomy being practised by farmers.

Horticultural production continued to expand, in spite of the droughts and frosts. This was due, in some measure, to the diversification into vegetable production by new producers making use of water provided under the Farms Irrigation Fund. The frost did severe damage to most types of citrus, the effects of which were felt immediately on markets but which will continue to be felt for some time, particularly in the reduced supply of nursery material. Both coffee and tea were damaged by frost but new plantings continue.

At Grasslands Research Station, the important work of the Bacteriological Laboratory and Legume Inoculant Factory continues. New isolates were made in the laboratory, which now has 709 strains for 360 legume species. The factory produced 28,000 bottles of inoculant and, for the first time, income from sales exceeded factory production costs. In future, inoculants will be sold in a peat base.

More than 3,000 persons, mainly African, visited the small-scale farming units at Henderson Research Station during the year, where good progress has been made over the past few years in solving technical problems and in improving profitability of the various farming systems under test. It is now necessary—and this is not possible on a research station—to test the systems in practice when operated by Africans in their own farming areas.

Despite the country-wide shortage of impounded waters, this year there has been a considerable demand for technical advice on fish farming from Henderson Research Station. Training courses in fisheries were held on the station for Conex extension assistants, and all demands for sale of fish fingerlings were met during the year. A particularly successful bass breeding season allowed the station to provide the Department of National Parks and Wild Life Management with 70,000 fingerlings for stocking Lake Kyle.

Agronomy

The first summer programme at Chiredzi Research Station included experiments on cotton, maize, soya-beans, ground-nuts, sun-flowers, sorghums, burley tobacco, rice and safflower. The dry season proved favourable for cotton, and results showed that, although application of phosphate was essential, nitrogen caused yield depression; between-row spacings were not critical but yields were reduced at close plant spacing in the rows; there was no advantage in topping; and the crop could withstand severe conditions of moisture stress during the early growth stages.

Short-season maize varieties yielded well at 35 to 40 bags per acre, with optimum populations of 20,000 to 23,000 plants per acre. Soya-bean trials also showed that short, quick-maturing varieties were best suited to lowveld conditions; variety Rhosa proved best, with yields of up to 15 bags per acre. Similarly, short-season ground-nut varieties proved better than long-season types, and yields of up to 17 bags per acre were recorded. An irrigation frequency trial provided important information on the relative water requirements of long- and short-season ground-nut varieties. Spacing trials on soya-beans and ground-nuts showed that plant populations were not critical within reasonable limits. A sunflower trial gave 15 bags per acre from a dwarf variety, and sorghum varieties averaged 25 bags per acre. Important observations were made on the optimum water requirements of burley tobacco and rice, both of which yielded exceptionally well.

The 1968 winter season was unusually cold, and severe frosts were recorded in mid-June. Seed bean crops were affected at a critical stage by frosts, and yields were reduced accordingly, but confirmed those obtained previously in respect of optimum nitrogen requirements and irrigation control. Seed inoculation proved of little benefit in relation to the response from applied nitrogen.

At Sabi Valley Experiment Station, trials were conducted on cotton, maize, soya-beans and lucerne during the summer season, and on wheat and beans in winter. Yields of cotton were of the order of 4,000 lb. per acre. Rhodesian maize hybrids stood up poorly to the severe summer conditions. Observation trials were conducted on lucerne to study the effects of various cultural and fertilizer practices, in an attempt to improve the longevity of the lucerne stand and to control grass weed encroachment.

At Chisumbanje Experiment Station, a successful series of summer and winter trials was conducted. In two cotton trials, which averaged 4,900 and 4,700 lbs. seed cotton per acre, nitrogen increased yields slightly but could not be justified economically. Yields from ground-nut trials were disappointing at about 12 bags per acre.

At Gatooma Research Station, the poor rainfall conditions caused complete failure in eight of the 12 cotton trials and in all seven of the trials conducted for other stations. In the successful trials, significant increases in yield were obtained from water-planting and planting on ridges.

At Grasslands Research Station, ground-nuts under supplementary irrigation gave increases in yield from gypsum applications up to 600 lb. per acre, and with heavy dressings of nitrogen gave lower kernel yield but higher hay yields. Also at Grasslands, under supplementary irrigation, soya-bean yields reached 16 bags per acre and maize yields were up to 55 bags per acre. Under dry-land conditions, maize yielded up to 22 bags per acre. In a long-term trial where effects of compost and depth of ploughing are being studied, maize yields were moderately increased when two tons dry matter of compost had been applied each year for three years but no benefit was shown by ploughing deeper than four inches.

At Matopos Research Station, 81 cultivars of grain sorghum were tested; as in previous years, the hybrids NK 300 and NK 300A gave the highest yields at most centres. Late planting of ground-nuts grown under irrigation on sandveld was found to reduce yields, especially in the case of the variety Makulu Red. This late-maturing variety remained on the land for some two months longer than the quicker-maturing varieties Valencia and Natal Common, and required nine inches more water but yielded only 1.4 bags per acre more than the early-maturing varieties. The mean yield of the trial was 15.9 bags per acre. The average yields of dry-land and irrigated grain

sorghum grown in fertilizer trials on sandveld were, respectively, 17.7 and 36.2 bags per acre. In an irrigated variety trial on soya-beans the highest yielding variety Hood, gave 15.2 bags per acre, while the average yield of the trial was 11.9 bags per acre.

Specialization by the Agronomy staff at Henderson Research Station on weed-control has resulted in the development of comprehensive programmes for testing the large number of herbicides currently available for their effects on the main weeds in arable lands and their possible toxic effects on crops such as maize, cotton, soya-beans and ground-nuts. Methods of application and optimum dosage rates are being investigated. These studies are being done on a variety of soil types on the station as well as in different ecological regions. In addition, relevant biological and cultural studies are in progress to investigate seed production by some of the common weeds, the viability of this seed and the critical periods in crop growth when weed competition adversely affects eventual crop yield.

Plant Breeding

There has been a substantial increase in the Department's establishment of plant breeders, the majority of whom are stationed at Salisbury Research Station, where the climate and a high degree of soil uniformity make it particularly suitable for the development and testing of new varietal material of a range of economically important crops. The crops at present receiving primary consideration are maize, on which work was started in 1932, wheat and, to a lesser extent, barley and oats, the legumes soya-beans, and ground-nuts and potatoes. The varieties developed in this programme have already made a considerable impact on maize and wheat production in the country. More than 93 per cent. of the maize acreage and all the wheat acreage on European-owned farms is now planted to varieties developed at Salisbury, all of which are giving substantially higher yields than the varieties they replaced. Whilst there is little doubt that material from the soya-bean programme will prove superior, it is too early yet to estimate what increases in yield will result.

Maize

Work is in progress to produce a high-protein version of the single hybrid SR.52 by transferring opaque-2 genes to its two inbred parents. It

remains to be seen what effect the introduction of these genes has on yield. A collection of divergent, open-pollinated varieties from a number of Central and South American countries has been introduced to broaden the genetic base from which further improvement can be made in the development of hybrid varieties.

Wheat

With the object of developing varieties more suitable for low altitudes, third-generation breeding material was grown at Chiredzi this winter, and selections were made under lowveld conditions. In Salisbury, more than 60 new crosses were made, primarily between high-yielding, dwarf varieties and good sources of rust resistance and baking quality. Whilst full baking tests by the Rhodesian Milling Company provide the final quality assessment of new varieties, the need has arisen for early generation quality tests as a guide to selection. Through the assistance of Chemistry Branch, samples in the third generation are now being subjected to the micro-sedimentation test which provides a useful indication of gluten quality.

Barley

Following an increase in commercial interest in Rhodesian barleys, the varieties B.14 and B.44 were released for multiplication by Rhodesian Breweries Ltd. Both are superior in malting quality to the varieties being grown at present. A number of introductions, including some top-quality Danish barleys, were made in an effort to build up a more extensive range of germplasm. Breeding work has consisted of the screening of two-row strains for uniformity and the development of dwarf varieties resistant to powdery mildew through crosses with locally adapted strains.

Oats

The local demand for oats, both for forage and seed purposes, led to the introduction and screening of 39 new strains from Beltsville. Several of the more promising varieties will be bulked and tested in yield trials.

Potatoes

Foundation seed of five varieties, Up-to-Date, Kurrel, Atleet, Pimpnel and Cedara, was produced at Inyanga, and released to members of the Seed Potato Association for bulking. Next year,

seed of other varieties will be ready for release. In the greenhouse, the crossing programme was successful and a considerable quantity of seed has been produced. A number of promising new varieties from Germany and Mexico have been used as parents in these crosses.

Soya-beans

The breeding programme made satisfactory progress. Progeny bulks from 77 different crosses were grown. Of these, 15 were from the first crosses made in 1963 and, from them, 500 single plants were selected and will be grown in progeny plots next year. During the 1968 winter, Chiredzi Research Station grew 61 progeny bulks successfully, and a number of new crosses, including multiple crosses involving up to six parental varieties, were established in the temperature-controlled greenhouses on the Salisbury station.

Ground-nuts

The detailed study of the station's collection of ground-nut material was completed, and data collected will make possible an improvement on Bunting's classification. Numerous selections were made from this material, and from outcrosses with Makulu Red, for further evaluation. Seed of more than 200 introductions, most of which were obtained from North Carolina, was bulked up, and from it nearly 100 early- and late-maturing lines have been selected for critical yield evaluation starting in the coming season.

Cotton

The very poor season at Gatooma Research Station, in which only 15 inches of rain fell, together with a lack of irrigation facilities, had a serious effect on the cotton breeding programme. The 14 top strains in the recurrent selection programme, based on yield, ginning out-turn and seed index, were selected to go forward for crossing in all combinations during 1968-69. Twenty-two of the 1967 Deltapine Smooth Leaf progenies were retained for trial in Scott, Mississippi, and at Sabi Experiment Station. All 11 strains of Del Cerro were retained for a further year, and the new introductions made from the U.S.A. in 1967 performed well.

Planted pastures

At Grasslands Research Station, all grazing experiments on planted grass had to be destocked

for varying periods during the summer because of the drought. Greatest gains per acre with 120 lb. nitrogen per acre were produced by Wintergreen Paspalum (333 lb.). In a cutting trial, Lovegrass produced the highest yields, but it was noteworthy that yields of Muguga Star were least reduced by the dry weather, in comparison with more normal seasons.

Trifolium semipilosum was badly affected by the drought, although it had a residual effect in increasing grass yields. *Lotononis bainesii*, on the other hand, thrived, and its inclusion in the sward resulted in dry matter and crude protein yields similar to those obtained by the application of 133 lb. N per acre to grass alone. Satisfactory progress continues to be made in selecting nematode-resistant strains of these two legumes.

At Henderson Research Station, results of experiments with pastures given heavy dressings of nitrogenous fertilizer and heavily grazed by cattle during summer are of particular interest and significance. This work has shown that small areas of well-fertilized planted pasture can relieve comparatively large areas of veld from grazing in summer, when the latter is most susceptible to damage. In support of the grazing trials, there is an intensive selection programme for grasses which efficiently utilize applied fertilizer, are capable of withstanding intense grazing pressure and are also nutritious to the grazing animal.

Horticulture

Rhodes Inyanga Experiment Station experienced the lowest rainfall total (29.16 inches) since 1921-22. Although frosts were both heavy and numerous in June, a warm July, August and September accelerated the flowering of most fruits. Records of flowering and picking dates have been extended to include more apple and pear varieties, and observational work in the screening trials generally has been intensified.

In the peach management trial, trees in paraquat-treated plots continued to outyield those under traditional management. The only obvious treatment effect in the apple establishment trial was a 12 per cent. greater total extension growth in DD-fumigated plots.

At Henderson Research Station, horticultural studies in progress include the evaluation of vegetable cultivars and investigations of cultural practices. The work also includes studies with deciduous fruit, especially grapes, and the selection

of *Pyrethrum* varieties to improve uniformity of flowering.

In the lowveld, the planning and development of horticultural research at Chiredzi is proceeding with the designing of a comprehensive subtropical fruit research programme suitable for the needs of the expanding and diversifying lowveld area. The programme embraces such crops as citrus, bananas, mangoes, avocados, litchis and various nut crops, which are now in the preliminary stages of establishment. The first of a series of vegetable variety screening trials was completed as a forerunner to more critical work in this field, and as part of a continuing programme to evaluate the winter vegetable potential of the lowveld. Yields were encouraging, and useful information was recorded on growth-rate, pest and disease incidence, and quality factors.

In the programme on coffee at Chipinga Experiment Station, emphasis is being placed on the disease and quality characteristics of varieties, the effects of shade and shelter, nitrogen and water amounts, and pruning. The programme on tea, also at Chipinga, is at an earlier stage, but introductions have been made to start a screening trial for a wide-range material and for a seed-bearer nursery. Trials on minor element deficiencies, irrigation and fertilizers for tea have been started on co-operating tea estates.

BRANCH OF BIOMETRICS

The Biometrics Branch was formed in January, 1968, with the staff of the biometrics team of the dissolved Agricultural Research Council. The branch, due to its familiarity with current research projects and its possession of a proven system of computer routines, was able, from the outset, to give much assistance in the planning and the analysis of surveys and experiments.

An arrangement has been made with Air Rhodesia, permitting the use of their I.C.L. 1500 computer, to evaluate data. The amount of analysis undertaken has expanded rapidly, and the average of 18 hours per month is at a level similar to that undertaken by the A.R.C. biometrics team, which catered for the needs of all three Central African Territories. More than 80 different projects have been undertaken, with approximately 14 per cent. of the total computer time being used for Conex work and research originating from other organizations, such as the Pig Industry Board, Rhodesia Sugar Association and the University College.

Much effort has been devoted to the study of techniques used to evaluate grassland, for this problem is paramount in any investigation of different veld management systems. A scheme is being devised to apply computerized methods to the data from the Beef Recording Scheme organized by Conex. Breeding programmes in cotton, maize, soya-beans, etc., which lead to detailed and complex trials, are being assisted by study of the many measurements taken to characterize each potential new variety. In a crop like cotton, where quality is an important character, but difficult to assess with experimental material, the application of complex multivariate procedures shows some promise. Detailed examination of animal carcass composition has assisted the understanding of response to nutrition and environment factors.

Much of the work with which the branch has become involved is of a continuing and expanding nature. There are many other projects where the application of biometrical methods is also desirable; and, since demands on computer time are expected to increase very considerably, it is necessary now to ensure that suitable modern equipment is available in the future.

BRANCH OF CHEMISTRY AND SOIL SCIENCE

The analytical service provided to the farming industry and research stations of the Department has continued to grow. The number of soil samples on which fertilizer recommendations were made increased slightly (5 per cent.), and there was a 41 per cent. increase in the number analysed for compilation of scientific data or correlation with the results of critical field trials. Requests for fertilizer recommendations for tobacco continued to decline sharply (35 per cent.), while recommendations for cotton and for test-demonstration plots in Tribal Trust areas increased very markedly.

In support of the soil advisory service, fertilizer experiments were conducted on maize and cotton, while, in the laboratory, work has been done on zinc, boron and molybdenum, the last-mentioned as a result of wide-spread reports of symptoms suggestive of molybdenum deficiency.

The analysis of other agricultural materials has declined in number but the amount of work undertaken has increased. Analyses for regulatory purposes have been maintained, and completely

revised farm-feeds regulations have been promulgated.

A survey of the gossypol content of cottonseed-cake has been initiated, in collaboration with the Grain Marketing Board and the major oil-expressors. This substance is harmful to pigs and poultry, and limits the extent to which cottonseed-cake can be used in stock-feeds.

The spectrographic laboratory has been brought back into full commission and is again available for the diagnosis of nutritional disorders in growing crops. Surveys are also being carried out on foliar nutrient-levels of deciduous fruit-trees and coffee.

In collaboration with the aflatoxin research team of the Department, work has continued on the problem of aflatoxin contamination of ground-nuts. The annual survey of the intake at depots of the Grain Marketing Board has revealed appreciable higher levels of contamination than in the previous two seasons. This is attributed to the adverse effect of the drought on growing conditions and to the higher temperatures prevailing in the pre-lifting period.

Soil-physics research has been curtailed, owing to the absence, during the winter, of the soil physicist on a study tour of Australia. However, during the summer seasons a number of experiments were carried out, including studies of the minimum moisture requirements of maize planted before the rains, and the tolerance of ground-nuts to moisture shortage in the latter part of the season.

Pedologists have carried out 29 soil surveys and investigations. These include five large-scale projects, three of which were in the south-eastern lowveld. Research has been started into the processes by which clay has been, and continues to be, lost from granite-derived soils in Rhodesia, which has an important bearing on their inherent fertility.

With increasing urban development, the disposal and beneficial utilization of municipal sewage effluents is a problem of growing importance. Accordingly, an irrigation scheme that has used sewage effluent without interruption for 17 years was investigated to determine the effects on both soils and regeneration water. Encouraging results were obtained and observations will continue.

With the dissolution of the Agricultural Research Council of Central Africa, its Soil Productivity Research Laboratory at Marandellas was

attached to the branch. Its staff will continue to function as a team, adopting an integrated chemical, physical and microbiological approach to problems of soil productivity.

Physical and chemical studies of the effects of increasing depth of ploughing have continued, and analyses of samples from long-term maintenance-of-fertility trials on granite sandveld have entered their sixth year. Unfortunately, field trials in the series on liming and plant nutrition were spoilt by drought, but greenhouse experiments on magnesium nutrition, with special reference to calcium status, and on the fertilizer and trace-element requirements of sandveld vleis soils, have yielded useful data.

Microbiological studies have continued into the decline in numbers and efficiency of rhizobia introduced into sandveld soils. Isolates of naturally occurring rhizobia are being prepared, and their efficiency on a range of introduced legumes is being determined. Studies are also being made of the build-up of populations of pathogenic organisms in the soil, in particular *Fusarium* and *Verticillium*.

An important expansion of the branches' activities during the year was the appointment of a research biochemist. In collaboration with the Plant Protection Branch, he has started work on the extraction and isolation of the sex attractant of the female maize stalk-borer moth, with a view to its identification, synthesis, and ultimate use for biological control of the pest.

BRANCH OF PLANT PROTECTION

Entomology

Work was commenced on the study of the persistence of insecticides in Rhodesian soils. In soil fauna studies techniques for the extraction of soil arthropods were compared. Of the methods investigated, the grease-plate method gave the most consistent and complete extraction.

Insecticide screening trials against Diamond Back Moth on cabbages showed that Malathion at 2 lb. a.i. per acre and D.D.T. at 5 lb. a.i. per acre gave almost 100 per cent. control when applied weekly. Control resulted in a better quality of cabbage, although over-all gross leaf yield was not significantly increased.

Dimecron, Birlane, monocrotophos, Bidrin and Ultracide were promising in spray trials against potato tuber moth. Gardona and Malathion were relatively ineffective.

Work on the sex attractant in maize stalk-borer has been commenced in conjunction with the Branch of Chemistry and Soil Science. The acquisition of sufficiently large numbers of female moths for extraction purposes is presenting some difficulty.

Studies on the biology of the three major parasites of citrus psylla have continued, and the study of the life-cycle, fecundity, longevity and behaviour of one species has been completed.

Sampling of maize and sorghum in the Chikwoka, Mondoro, Chiweshe, and Zwimba Tribal Trust Lands has been commenced to determine the amount of infestation in stored grain and the losses occurring in African areas.

The parasite of potato tuber moth, *Copidosoma*, has been released in several parts of the country, and it is evident that the parasite has become firmly established in Rhodesia.

Cotton Pest Research Team, Gatooma

Severe drought hampered field trial work during the summer season.

A number of promising acaricides have been selected by screening, following reports of poor performance of dimethoate. The highly toxic monocrotophos has proven to be the most effective acaricide in the lowveld. Binapacryl remains the most superior contact material.

Only monocrotophos showed promise in trials carried out to control *Plusia acuta* in the Chiredzi area.

The physical assessment of mist-blowers showed that, with the three machines available, spray cover was poor, in comparison with tailboom equipment. Application of sprays by mist-blowers cannot, at the moment, be recommended.

The detailed investigation of factors involved in the induction and termination of diapause in *Diparopsis castanea* was continued.

Nematology

The discovery of the burrowing nematode, *Radopholus similis*, on bananas in the lowveld is a matter of concern, and may necessitate legislative action to limit its spread. The nematode is one of the most serious of the plant-parasitic nematodes, and has not previously been recorded from Central and Southern Africa.

Apparatus designed to hot-water treat up to 300 lb. of seed potatoes in order to control nematodes was constructed and operated successfully.

Studies were continued on the toxicity of methyl bromide as a soil fumigant to citrus seedlings.

In trials, three varieties of soya-beans appeared to show some resistance to the common root-knot nematode.

Plant pathology

The incidence of *Verticillium* wilt of cotton showed a considerable increase over previous years, and severe levels of infection occurred at Nyanyadzi and Umtali North. Most outbreaks occurred in irrigated cotton crops in the eastern part of the country.

Bark disease of coffee also increased in prevalence, and was recorded from three more farms in the Chipinga district.

Preliminary trials indicated that mancozeb plus copper sprays were as effective as Bordeaux mixture in controlling downy mildew on grape vines.

Mancozeb and daconil were more effective than antracol and fentin acetate in controlling late blight of potatoes.

Brown spot, a potentially serious disease of rice, was recorded for the first time in Rhodesia on crops grown from imported seed in the lowveld.

Stem rust of wheat was not recorded from any part of the country until mid-September, and negligible damage from this disease occurred.

Seed Services

The number of samples received at the Seed Testing Laboratory showed an appreciable increase of 747 over the previous year.

The total acreage inspected for seed, excluding seed maize, was 9,204 acres, an increase of 9 per cent. over the previous year. Larger acreages of soya-beans and ground-nuts were planted for seed purposes.

The new Seed Certification Scheme Notice was completed, and this notice, with the Seed Regulations, will be promulgated during the early part of 1969.

The volume of fruit submitted for inspection under the National Mark Regulations was 54 per cent. higher than in the previous year.

AGRICULTURAL EDUCATION

Gwebi College of Agriculture

The season's rainfall was well below normal, resulting in a very difficult cropping season and

reduced yields. Maize realized 13 bags an acre, which was insufficient to meet the college's internal requirements.

Alterations to the hostel are nearing completion, to cater for the increased intake of students, and the new laundry should be complete by the end of the first term.

Mobil Oil Rhodesia (Pvt.) Ltd. presented the college with an extremely fine cut-away engine, and has offered to equip a modern service-bay.

Rhodesian Breweries, The Rhodesian Milling Co. and Albatros Fisons Fertilizers have made substantial contributions towards the modifications to the sports pavilion, to incorporate a country-type pub.

In the Animal Husbandry Section, the college dairy herd continued its most satisfactory high level of production, exceeding 11,000 lb. of milk per lactation recorded. Twelve young Hereford bulls were sold at a combined Hereford sale staged at the Salisbury Showgrounds in September, averaging 130 guineas each.

The Engineering Section had a very busy year, assisting in the general maintenance and development of various college facilities, and was involved in the second in-service training session held at the college during the long vacation.

Diploma day was held on 18th October, 1967, with the Honourable G. W. Rudland and Mrs. Rudland as guests of honour.

Thirty-four students sat the final Diploma examinations in June, 1968. Thirty obtained Diplomas of the College, 11 of these being first-class. Of Course 19, 42 strong initially, 38 passed into their second year; Course 20 commenced with a total of 46 students, making an over-all total of 84 men in residence. This latest increase in numbers, from 78 to 84, marks the last expansion possible at the college, for it is considered that any further increase would seriously affect the standard of practical instruction offered.

Research activity is restricted, student education being the main priority. However, various investigations were undertaken in conjunction with other departments of the Ministry, and several papers were submitted for publication by the Poultry Section.

During the long vacation, the college exhibited livestock at the Umtali, Salisbury and Bulawayo shows. Several awards were achieved against very

strong competition. For the first time for many years, the college exhibited poultry at the Salisbury Show, with marked success.

As usual, the college is greatly indebted to the many officers of our own Ministry, of other ministries and of the University, and to members of commercial and industrial concerns who assist the college in the capacity of visiting lecturers. Their willing co-operation and contribution during the Diploma Course is very gratefully acknowledged.

Chibero College of Agriculture

The Fifth Diploma Day Ceremony was held on the 10th April, 1968, when the Prime Minister, the Honourable I. D. Smith, M.P., and Mrs. Smith were the guests of honour. Mr. Smith addressed 350 guests, students and staff, and Mrs. Smith presented 10 diplomas and various awards to the successful recipients.

In common with the whole drought-stricken country, the college experienced its lowest-ever-recorded "effective" rainfall in the 1967-68 cropping season, with the result that, in general, yields were significantly lower than in former years, except for Burley tobacco and cotton, which were supplementary irrigated. Further, it is disappointing to record that the new 24,000,000-gallon flood irrigation dam on a tributary of the Nyawiye River received only one-eighth of its maximum capacity from the catchment area run-off and, consequently, the planned winter programme for 1968 had to be abandoned. In view of the 19.4 degrees of ground-frost recorded during one night in June, that programme might have suffered severe damage. Despite all these adverse climatic conditions, however, adequate supplementary feeding was provided for the maintenance of the various well-established livestock enterprises, to which was added a small instructional breeding unit of rabbits.

The year commenced with 57 students in residence and, apart from the 10 students of Course 5 who obtained diplomas nine successfully completed the second year of Course 6 and 23 the first year of Course 7. By the end of the year, 39 students had been enrolled into Course 8.

Having concluded our three-year expansion programme, the College Advisory Council turned its attention to the improvement of student recreational facilities. Following a rewarding fund-raising campaign, a 75- by 35-foot swimming-pool, incorporating a one-metre diving-board,

filtration plant and changing-rooms, was commenced in August, 1968. We acknowledge our indebtedness to a number of generous benefactors of this new project, including the Trustees of the Rhodesia State Lotteries, and it is hoped that the pool will be opened before the end of 1968.

It is fair to comment that there is now a more enlightened opinion as to our contribution to Rhodesian agricultural education, and this is magnificently demonstrated in the establishment of a "Chibero Project" by the Australia-Rhodesia Association of Victoria, resulting in the first award of an "overseas" scholarship to a third-year student for 1968-69. In acknowledging this gesture of goodwill, we pay tribute also to the many Rhodesian sponsors who continue to support students of the college financially, thereby

assisting them to a successful and fruitful career in agriculture.

In-service training

In-service training proceeded normally during the year. Five students began work for the third-year examinations, to be held in September, 1969, together with the third intake of students.

All course material for the full three years' work is expected to be available by the end of this year; the labour of preparing this has involved the co-operation of many members of the Department.

P. A. DONOVAN,

*Acting Director,
Department of Research and
Specialist Services.*

Annual Report of the Director of Conservation and Extension

for the year ended 30th September, 1968

ORGANIZATION AND STAFF

Organization

THE reorganization of the Department's work areas continued during the year. This followed the decision, made during 1966, to revert to the position where individual field officers are responsible for agricultural development within clearly defined areas, either farming areas only or tribal areas only.

Mashonaland North is now the only province which is still operating on a geographic division of work areas, and is unable to adopt the new system entirely until two additional Group Officer posts are provided.

Senior staff

Staff responded magnificently to the extreme pressure of work imposed by the drought and consequent relief measures. Furthermore, it was very pleasing to be able to report that a steady stream of prospective candidates for posts in this Department has been coming forward since the introduction of the new salary scales. If this trend continues, our establishment may well be filled during 1969, for the first time for many years.

Several bursary students are bonded to the Department and are due to qualify at the end of the year. Bursaries, together with the new salary scales which provide for long scales, will go a long way, not only to attract recruits to the Department but also to retain existing staff. This will lead to stability in the Department, absolutely essential in providing the best service to the farming community.

In January, the three branches of Agronomy, Animal Husbandry and Tobacco were amalgamated to form the Husbandry Branch, under the control of the Chief Husbandry Officer. This change coincided with the advanced salary scales introduced for the five Heads of Branch posts, i.e. Husbandry, Engineering, Training, Planning and Irrigation.

During the year, three Economics and Markets Branch posts were transferred to Planning Branch, which has now been reorganized. This branch now

consists of a Planning Section and a Farm Management Section which deals with farm management and work study.

To cater for the need for specialist advice on veld management, one Animal Husbandry Extension Officer post has been converted to the post of Pasture Specialist Extension Officer. This is particularly pleasing, in view of the fact that the Animal Husbandry Section incorporates pasture and veld management specialization, but for the past few years without the benefit of a specialist within this field in the Department.

The establishment of youth extension officers has been increased by the addition of a post at Victoria, and an application has been recommended for appointment.

This Department has always worked hand in hand with the I.C.A. movement. In the light of our staff position and the constant demands which are made on the time available to extension officers, the need for even closer co-operation by I.C.A.s in the planning of their programmes is more urgent and necessary now than it has been at any time in the past.

The programmes in some I.C.A.s and groups of I.C.A.s are the results of joint I.C.A. and Conex effort, while, in other areas, the planning is left to the extension officer; the I.C.A. does the rubber stamping but the extension officer does the work.

In the interests of maximum efficiency and optimum use of the extension officer's time, programme planning must be a co-ordinated effort; our staff should be brought into I.C.A. programmes, not they into ours. Appendix X (Hour utilization by European staff) shows how the field staff of the Department spends its working hours. It is interesting to note that less than one-third of the time is spent on true extension. The remainder includes administration (20.8 per cent.), inspections (6.3 per cent.), soil and water conservation (13.4 per cent.), and various other activities for which they are trained.

Officers of the Department are involved in a large number of committees, where their professional advice is sought in matters ranging from youth extension to farm management. Head Office

staff are involved in 64 committees in Salisbury, whilst provincial and district staff are proportionately involved in their own spheres. Appendix XI gives details of meetings regularly attended by Conex staff.

Junior staff

Junior staff morale is reasonably high, but supervisors and extension assistant numbers are still insufficient to meet the needs of the farmers who require servicing. Supervisors, it is pleasing to note, are now becoming aware of their true function of leadership and supervision.

Housing

The position with regard to senior staff is generally satisfactory, with the exception of Umtali, where it is difficult to obtain accommodation, and in the Victoria Province, where the position is described as "lamentable".

As regards our junior staff, however, the housing problem is worsening. Not only are insufficient houses available, but the maintenance of those that do exist leaves very much to be desired. Although a few new houses were built during the year, many of our extension assistants are living in condemned houses and temporary galvanized structures referred to as "tin kennels". This is very disquieting, and urgent attention to this most unsatisfactory situation is imperative.

Water-supplies

The provision of water-supplies for junior staff houses has always been a problem, but the drought has made a bad situation acute. It is depressing to record that very many of our staff have had to buy their household water needs from local tribesmen; many have had to go as far as six miles to obtain a supply. The position in some areas of the Victoria Province was particularly bad, and temporary transfers from waterless areas became necessary.

Supervision

Supervision in vast rural areas is difficult, especially in view of the restricted mileage allocations and the shortage of extension officers and supervisors. However, regular staff meetings, programme planning and itineraries planned a month in advance help to keep the position fairly satisfactory. As was expected, motorized supervisors have proved to be more efficient than those who are dependent upon bicycles.

Visits to other countries

As was the case last year, most of the visits made by members of the Department to other countries were to South Africa. In addition to South Africa, visits were made to the United Kingdom, the Continent, North America, Malawi and Angola. Visits are detailed in Appendix I.

SPECIAL ACTIVITIES

Engineering

Farm buildings

The work of this section has been directed to investigations, reference research and trials on several crops, processes and procedures, and to the writing of reports and bulletins thereon. In addition, detailed farmer advice is being given on a few selected farms, where projects serve as demonstrations for other farmers. This shift of emphasis is an attempt to reach a broader field of farmers and, in particular, the leaders and innovators. It is expected that this work should greatly improve farmer knowledge and the standards of farm buildings and structures, and lead to more efficient capital use and better returns.

The Grain Producers' Association of the R.N.F.U. organized a tour of the maize triangle of South Africa, where bulk handling methods and facilities were studied. The Senior Farm Building Architect was one of the tourists who studied maize-handling techniques, facilities and equipment from field to bulk depot. The ideas assimilated are now being passed on to those Rhodesian farmers who will be involved in the transition from bag to bulk handling when the new Grain Marketing Board bulk depot at Concession comes into operation, in 1969.

Farm machinery

Two significant events occurred during the year. The World Ploughing Contest was held by the World Ploughing Association at Kent Estate, near Norton. The opportunity was taken to hold an international symposium on "Soil tillage in the tropics", under the auspices of the organization.

Both these events were highly successful, and those concerned with their organization are to be praised for the success of this major event. The Ploughing Association of Rhodesia is also to be congratulated on bringing these events to Rhodesia.

The Department has acquired for red soil tillage trials and farm machinery testing, a section of Hatcliffe Estate, near Salisbury. This property will enable the Department in conjunction with the Standing Committee on Agricultural Mechanization, to become more active in promoting better tillage practices, and for ensuring that the machinery available to farmers is suited to the job.

Machinery and tillage investigations

Major projects during the year have been the continuation of the work on knapsack sprayers for the Cotton Growers' Association and evaluation of knapsack dusters for the Tobacco Research Board. In addition, six other minor investigations were undertaken and reports issued.

Work on crop dryers and crop drying criteria will soon be started with the object of developing acceptable types of dryers suitable for local conditions.

The trials on depth and type of ploughing which started at Domboshawa, Grasslands and Makaholi in 1964 are now showing significant differences between the various treatments, particularly as regards the depth of ploughing at Makaholi and Domboshawa, and (at Domboshawa) the type of plough used.

The frequency of ploughing and various minimum tillage trials at Domboshawa and Henderson show promise, but must be continued to give conclusive results.

An improved ox-drawn dam-scoop has been designed by staff of the Engineering Branch, in co-operation with a local manufacturer. The need for this arose in consequence of the publicity given to the dam-scoops for contour construction in the African areas. The improved dam-scoops, which are already available to the public, require less human effort to operate, and simplify the construction of contour banks.

Very considerable public interest was displayed in a symposium on "The re-use of sewage effluent", which was arranged and organized by Conex. Nearly 120 delegates, representing various government and public bodies, as well as a number of private organizations and firms, attend the symposium in Bulawayo.

PLANNING

During the year, the Planning Section has completed 42 farm plans, covering approximately

130,000 acres, and two regional plans covering, 2,200,000 acres. In addition, six farms are presently being planned.

Detailed surveys of four farms have been made with irrigation development in view in the Rusape I.C.A., and land classification maps covering 44,000 acres have been reassessed for irrigation potential.

Carrying capacity assessments covered 91,000 acres and, in addition, assistance was given to local staff.

Shangani grazing trials are being conducted on de Beers Ranch to assess range conditions, and, in Masembura T.T.L., map overlays have been prepared to show statistical data, including vegetation and soils.

There has been a steady demand for farm plans, but extraneous duties imposed on the field staff have prevented the production of as many plans as would otherwise have been possible. The number of plans prepared for farms in I.C.A.s dropped this year to 67, as against 71 during the previous 12 months, but in the Purchase Areas these increased from 50 last year to 96 during the year under review.

The Planning Section has also assisted with bush-control trials in various parts of the country. Although the trials are not yet complete, preliminary reports indicate results varying from "not much to report yet" to "spectacular".

Four courses were conducted during the year by the section, and planning officers lectured at eight other courses and field-days. Courses followed by the branch staff varied from in-service training to a Bachelor of Science Degree course.

A return to normal seasons and a reduction in the extraneous work thrown on our staff will enable farm planning to come once more to the forefront of the Department's activities.

Work study

Work study investigations continue and, on 353 visits to farms, the following were studied: cotton, ground-nuts, fruit, soya-beans, potato-grading, coffee-picking, cattle-handling and Purchase Area labour-recording. Crop-drying units were also investigated, in collaboration with Engineering Branch.

Farmers' meetings addressed by members of the Farm Management Section numbered 64, and

these were attended by 2,295 people. Lectures were also given to university students and others, while 155 request visits were made to farms.

It is proposed to decentralize farm management extension officers to provinces as provincial specialists during 1969; their duty will be to train and advise field staff in farm management.

TRAINING

Progress

In view of the intervening and priority requirements of drought-relief, some of the staff training courses planned for the year under review had to be cancelled. However, in spite of this extra work load on the field staff, it was possible to conduct a reasonably full programme of training.

Of the officers who joined Conex staff during the year, 27 were inducted through Training Branch at Head Office. These officers received an introductory departmental orientation, and short courses in aerial photography, elementary surveying and levelling.

The services of the Chief and Senior Training Officers have been in great demand outside the immediate and direct field of the Department's work. Collaborating with regional officers of the Ministry of Internal Affairs, Conex trainers have played major roles at community development seminars for district commissioners and district officers. The Chief Training Officer has also been closely associated with very important community development training for officers in the highest echelons of the Civil Service.

These calls upon us may indicate the lead this Department has taken in matters regarding training and extension methodology, and the importance that is accorded to this area of training by all who are concerned with rural development. Appendix IVa shows the number of courses held at the various training institutes. With the exception of Domboshawa, where the training instructor has not been resident, the other three institutes held more courses than they did last year, and the total increase in courses held amounted to 36 per cent. Training/trainee days and the number of persons participating were also up on last year's figures.

Junior staff training, based on local needs and the requirements of programme plans, is a continuous process, most of which is carried out at group and district level. Subjects covered include

conservation methods, pegging, land-use planning and photo interpretation, while chiefs' peggers are also trained in pegging and layouts.

Senior staff is trained in Salisbury, at the institutes or, for specialized subjects, on research stations.

Appendix IVb deals with courses held at district and provincial venues; the number of courses held has increased by 3.48 per cent.

In spite of the drought and many extraneous duties imposed on our staff, training is forging ahead, to the benefit of the farming community.

Training institutes

Generally, the institutes have had a very successful year. Statistically, there has been an increase in activity from 23,940 trainee/training days last year to 25,042 in the year currently reported upon. This can be attributed, principally, to a spectacular increase of training at Alvord, where trainee/training days increased by 4,682 to 14,285.

It is pertinent to remark that this 40 per cent. increase has been obtained in the face of the unsatisfactory financing of the institutes. The position at Alvord illustrates the situation: allocated funds allowed the institute to operate to only two-thirds of its capacity for the year, and its substantial overheads were thus not employed to optimum level.

Training Branch buses

The six buses have greatly improved the efficiency of institute operation. Each institute can fully employ a bus to bring trainees to courses and return them to their home districts; this alone can keep a bus and driver fully engaged. During the year the fleet has carried 23,000 passengers 123,000 miles.

Mobile training units

The branch has operated five units for almost the whole year. They have proved to be most effective in providing follow-up to residential training at institutes, and in support of local district programmes. They are of particular value, as they combine the two senses, seeing and hearing.

Almost 85,000 people have been contacted by the units this year.

Two important subjects have been prepared on colour slide sequences for training purposes via

the mobile training units. These are "Harvesting of ground-nuts" and "Cattle-fattening", each having an accompanying synchronized tape-recorded commentary in the vernacular language.

Extension research

During the year, the appointment of a second extension research officer doubled the professional strength of this section. The demands for service (not all originating within Conex) have exceeded our ability to respond, but the new appointment has made it possible to reduce the work backlog.

The Extension Research Section links Conex with other external bodies, ministries and departments. It has liaison with the Department of Sociology at the University College in the matter of sociological research needs, with Internal Affairs in the very important business of community delineation prior to the establishment of Tribal Land authorities, and also the related matter, traditional land tenure, into which research is being carried out. Investigations taking place at Bikita may have great significance for the implementation of the Tribal Trust Land Act, 1967.

Field staff is showing an increasing interest in the human and social problems associated with extension programmes. Three extension officers are currently undertaking research projects, under the guidance of the Senior Extension Research Officer.

Women's training

This section consists of only one post, and is restricted to a service from Head Office, consisting mainly of publications and written answers to requests for advice.

None the less, during the year, several lectures were given to groups from the Federation of African Women's Clubs, Presbyterian Women's Association, Young Farmers' Clubs, Women's Institute and National Council of Women. These same organizations have been among those who have requested technical advice from this section.

Booklets on vegetable and tomato cookery, and another which includes a variety of tested recipes, have been produced for African readers and are in great demand. A booklet on deep freezing has been prepared for European readers.

This section has given assistance at the Harari Central Hospital Nutrition Unit, which has an

educational role in teaching mothers how to provide a balanced diet for the family and, particularly, for children suffering from kwashiorkor. The nutrition provided by a small vegetable plot, rabbits and poultry is explained to the mother.

In some provinces, work with women's clubs is undertaken by community advisers of the Ministry of Internal Affairs, with the assistance of Conex when requested. In others, a considerable amount of time is spent with these clubs, a popular subject being vegetable production. Officers' wives frequently assist in the running of the clubs.

Publications

Grateful acknowledgement is given to the Department of Printing and Stationery for their excellent service to our Publications Section; it is no criticism of that department that Conex could make greater use of printed material had it some production resources of its own.

The revision of the Agricultural Handbook continues, and it is hoped that this will be completed during the forthcoming year, when it will again be available to the general public from the Department of Printing and Stationery, at a price yet to be determined.

Twenty-seven members of the Department have written 85 articles, which have appeared in 14 publications. Details of these can be found in Appendix II.

Almost all the agricultural subject matter that is broadcast in Rhodesia comes directly or indirectly from Conex. The popular English-language broadcasts by the Natural Resources Board draw upon material provided by the Publications Section of Conex.

This same section is directly involved where the African broadcasting service is concerned, being responsible not only for the scripts but also for their translation into vernacular language, and even the production of programmes. For six months of the year (two alternate quarters), two 25-minute programmes, one Shona, one siNdebele, are broadcast each week to African farmers.

Farming reminders are regularly issued by the section and distributed through the Public Relations Officer of the Ministry of Agriculture to all mass media, including the national press.

Among African farmers, the *African Times*, *Kunzwa* and *Murimi* are circulated widely, and assist in disseminating news of value.

Some very good group and I.C.A. magazines and newsletters are being produced in the provinces, and are well received by the farming community.

Youth extension

This section has coped well with a dramatically expanding situation. Regular staff has been strengthened by the secondment of 10 extension assistants to full-time youth work, six in Victoria and four in Manicaland—the two provinces where youth activity is most vigorous.

A total of 464 young farmers'/natural resources clubs have been formed in Rhodesia, with members totalling almost 14,000 (1,300 European and 12,600 African), and these numbers continue to grow. The Youth Section, particularly, and Conex staff, generally, are constantly called upon to provide training in club leadership and guidance in project work.

Regional rallies are becoming important features of young farmer activity. The September Victoria Rally at Alvord Institute was commemorated by the building of a unity cairn; each participating club brought and built in its own individual and identifiable stone.

Victoria reports another innovation. A sorghum-growing contest at Chibi drew 165 entries and gained a tour of Salisbury for the six principal prize-winners.

LAND TENURE ADVISORY SERVICE

Advice on how to start farming and on the purchase of farms in Rhodesia was given to 260 persons from 17 countries, including 36 from Rhodesia, while advice on leases was given to 144 farmers.

The current trend is to larger farm production, and young men are finding it very difficult to obtain farms. This has been accentuated by diversification and the severe drought, which has led successful farmers throughout the country to watch for land for sale or lease, on which they might expand.

SERVICES

The farm visit is the most effective contact an extension worker makes with his clientele. It is in the personal and relatively informal circumstances of the meeting between the two men that the farmer can really present those problems that are peculiar to him and his farm to a sympathetic

listener who is ready to help. While there is no doubt that farm visits are time-consuming and expensive, they are none the less essential in extension work, and particularly effective when employed in combination with other extension methods. It is, therefore, disappointing to report that the true extension farm visit is a relative rarity. The farm visit nowadays is often in connexion with surveys of one sort or another, carried out on behalf of other agencies, Farm Irrigation Fund, Agricultural Assistance Board, Tenant Farming Scheme or diversification committees. Also, at the present time, there is a growing demand for advice about whole farming systems and farm management. Unless some of the intrusive work mentioned can be shed it is unlikely that our officers will be able to provide the farmer with the information and opportunity for discussion that his situation requires and which is best met by a farm visit.

In spite of the minimum extension contact presently possible, our staff has excellent acceptance in the farming communities. This contact may even be lost if visits continue to be only of the data-collection type.

In the present situation, with opportunities for farm visits limited, it is more than ever desirable that officers work to a plan agreed upon with their I.C.A. committees. Many are already doing this to great advantage and efficient use of time.

Diversification and drought-relief problems have brought an increasing number of farmers to our offices. Information on irrigation, horticulture, animal husbandry and economics is particularly sought.

The effectiveness of extension via groups is evidenced by the Department's long and fruitful association with such formal organizations as the I.C.A. committees, farmers' associations and R.N.F.U. Working with these organizations continues, and, in the case of the R.N.F.U., improved and profitable relationships are reported. In most parts of the country, I.C.A. committees are effective platforms for the dissemination of information, and perform a most useful service to the agricultural industry.

Work with informal groups, at field-days and in discussion groups is very effective extension, and is being widely employed. However, it must be acknowledged that no one method of extension can stand alone but needs to be used in combination with others to be wholly effective. Group methods stimulate interest which, ideally, should

be followed up by individual methods, particularly the farm visits. The difficulties associated with visits to farms have been dealt with fully above, and this paragraph serves to highlight the consequences of forfeiting extension for other duties that are considered to be, but may not be, of priority importance.

In many places, teaching via groups has been associated with test demonstration plots, which are now giving way to demonstrations of whole farming systems. This latter innovation can be the focus of agricultural extension for a whole community and greatly facilitate the work of field staff.

The extension service is using the various mass media more and more, but of greater significance is better understanding and more efficient use of the various methods, each of which has unique value and place in any extension programme. A large number of local newsletters are published, often initiated by our staff to be taken over by volunteers later. These publications usually start as a cyclostyled single sheet which can have only limited visual attraction; but often from this humble origin imaginative and attractive productions grow, which are avidly read and play an important part in local communication. Newsletters seem to be a more significant medium in ranching areas, where they provide a link with distant neighbours with whom personal contact is infrequent.

The local and national press is used as much as possible, and there is a good liaison between our officers and the provincial newspapers.

An increasing number of radio programmes are directed at the farming community, particularly those sponsored by commerce. Radio is particularly effective in announcing timely reminders, which this Department issues. European farmers seem to find this a very useful service.

This medium is also increasing in extension value in African areas, and seems to be more effective than the press, allowing for the fact that there are still relatively few people who have access to a radio set. The regularity of programmes and the reception of a message by the whole family at home increases the likelihood of messages being accepted. However, the effectiveness of radio as a vehicle of extension could be greatly enhanced by greater use of material with local interest. With only two national channels operating, it is difficult to develop local themes but, none the less, the principle is being subscribed to within the limits of present circumstances.

THE YEAR, THE LAND, DEVELOPMENT AND PRODUCTION

Although October and early November were cold, the best planting rains for many years fell in November. Little or no rain was recorded from the end of November, and the season ended up with the worst drought in memory.

The total rainfall for the season looks quite impressive on paper, but the distribution was so uneven that most of the rain that did fall was ineffective.

The over-all effect of the drought was to hit crop farmers all over the country, the rainfall being adequate for only about half the normal grass growth.

Water-supplies, both surface and underground, failed in many areas; hundreds of boreholes were sunk and interest in dam-construction revived. The only redeeming feature of the drought is that it has made farmers veld management conscious, to the extent that many are now reorganizing their paddocks and watering-points.

Farmers suffered a further calamity in June, when the worst frost since 1947 occurred throughout the country and destroyed standing annual crops, particularly vegetables grown in the early part of the winter. Fortunately, wheat had not started to flower and losses were not severe, but a heavy toll was taken of ornamental trees, citrus, coffee and tea; the last-mentioned two, however, are expected to recover. Matabeleland recorded temperatures 19° F. below freezing, and damage to winter-irrigated crops and vegetables was reported.

Frost wiped out tomatoes, potatoes and beans in Manicaland, while seed crops in Sabi Valley irrigation schemes were also badly frosted.

Vegetation, dried by the drought and desiccated by frost, was a severe fire hazard, and six Africans died in veld fires in the Karoi group. Three European homesteads and several thousand bags of maize were burnt.

SOIL CONSERVATION

The increasing number of farmers whose conservation standards, both mechanical and biological, are high, are to be congratulated. On the other hand, there are many whose standard of construction and, more particularly, maintenance of mechanical works leaves much to be desired.

While good progress has been maintained in the mechanical aspects of conservation, it must be realized that mechanical works alone cannot be fully effective unless coupled with appropriate and correct systems and methods of land use. This is the key to true conservation, and the foundation for the establishment of a stable and sound farming economy. It is this basic aspect of conservation which is still far too frequently overlooked. A disturbing feature of diversification is that many rotations and grass leys have been thrown overboard to provide the additional land required to compensate for the drop in net return per acre which follows the production of crops other than tobacco. In an endeavour to maintain net output from the farm, the land is likely to be used for cropping too frequently and, sooner or later (particularly on the steeper lands), the breaking point will be reached. If this practice is continued, erosion and all its associated evils will become widespread, and farmers will pay dearly for short-term exploitation.

Severe soil damage will inevitably follow where intensive cropping is practised without the benefit of sound rotations. Further, this intensive use of the soil is imposing increasing, and unknown, pressures on the land.

The demand for conservation in the Purchase Areas is slowly increasing, while the construction and maintenance of contours continues to improve. Biological and management practices, however, still leave much to be desired.

A very substantial increase in the pegging and construction of protection works has been shown in the Tribal Areas, but the gap between the two stages is still too large. The more widespread use of the improved dam-scoop, mentioned previously, should contribute to easier and more rapid construction of protective works, and thus go a long way towards reducing the discrepancy.

Severe demands for pegging have been imposed but all have been met.

Approximately 31,000 miles of contours were pegged, of which roughly 20,000 miles had been constructed by the end of September; most of the backlog of about 11,000 miles occurs in the Tribal Areas. This is accounted for by the conservation drive in these areas, where teams of peggers can peg contours much faster than they can be constructed (Appendix V; Soil conservation).

While enlightened tribesmen in Matabeleland request repeat conservation courses, Manicaland

reports that resistance to conservation work was encountered in the Sabi Valley, Inyanga North and north of Rusape. The Midlands Province mounted a concerted drive in close co-operation with the Ministries of Internal Affairs and (African) Education and the Natural Resources Board in those areas where mechanical conservation is unsatisfactory.

Chiefs' peggers are employed in all areas.

Grazing areas

The picture in the grazing areas is gloomy. Sheet and gully erosion is manifest almost everywhere and, should the rainy season begin with heavy storms, severe damage will inevitably occur. The drought has, however, made many farmers reconsider their veld management practices, and there is an unprecedented demand for advice on the subject from European farmers.

Great interest has been shown in the high-intensity, short-duration system of grazing; in some cases this has resulted in the introduction of some form of veld management where none had existed before.

With the exception of a portion of Sabi North Tribal Trust Land, where rotational grazing is being practised, very little is being done in this regard in the tribal grazing areas at present. The problem of the tribal grazing areas is sociological, related to communal tenure of the land and mystic cattle rites. It will probably only be solved once development areas are implemented and understood by the people.

Aerial surveys over both farming and tribal areas have helped to determine the focal points of serious erosion.

The provision of fire-guards has done much to control and reduce fires in the farming areas. The heavy frosts and the resultant tinder-dry grass created an awareness of the greater fire danger this year, and resulted in greater fire-precautions than normal but, in spite of this, fires have been more widespread in some areas.

Generally, the condition of the veld in the tribal areas is shocking. Insufficient dip-tanks and, all too frequently, inadequate water-points contribute towards the excessive stock concentrations in most parts of the country. The recent drought years have added to the difficulties and, if progress is to be made, a breakthrough in the barriers of custom, ignorance, conservatism and suspicion must be achieved.

While we can be justly proud of the conservation status of the very small percentage of the country which is under arable production in the European farming areas, the condition of the major portion of the 95 per cent. of Rhodesia which is only suitable for grazing purposes gives much cause for concern and alarm.

A survey to determine the condition of grazing land in Matabeleland revealed that, of the European area, 73 per cent. was classified medium and poorer in condition, with 17 per cent. in poor condition. In the African areas, more than 95 per cent. classified medium and poorer in condition and nearly 70 per cent. as being in bad condition. Considering that roughly 80 per cent. of the total area of grazing land is situated in the low- and marginal-rainfall areas, in very much the same condition as in Matabeleland, the fact that grazing areas in the African sector in the high-rainfall areas are overstocked, the country cannot tolerate or allow abusive systems and methods of veld utilization to continue. Active steps should be taken by persuasion, or even compulsion of farmers and tribal authorities, if necessary, to ensure that strict implementation of accepted principles of correct and sound veld utilization are observed and practised.

Associated with the degeneration of our veld is the insidious encroachment of bush. Bush encroachment is the biggest conservation problem we are facing. We hear a lot about uneconomic units and what should be done to put this right. What we are doing to ensure the economic viability of existing economic units?

Unless steps are taken now to prevent the encroachment of bush by veld control and veld improvement measures, many farms will be rendered uneconomic within the next decade.

Soil conservation, in its simplest concept, can be interpreted to mean good veld management. By sound and correct utilization of the veld, we will ensure that what belongs to posterity will be handed over to future generations intact.

WATER CONSERVATION AND UTILIZATION

The availability of Government loans through the Farm Irrigation Fund has greatly increased the demand for dams and weirs, particularly in respect of those large enough to provide for irrigation. An increased number of small dams have

been built for Purchase Area farmers with the assistance of the African Loan Fund, and in the tribal areas by local communities.

Over-all, there has been a 92 per cent. increase in the number of structures built, but the aggregate storage capacity is 11 per cent. less, when compared with last year's figures. This is because the greater majority are small dams, built by African farmers using ox-drawn dam-scoops, while fewer medium-size dams were constructed (Appendix VI: Water conservation).

Appendix VII details the types of storage works constructed during the year, and by whom constructed. Due to the increased demand for dams Government earthmoving units have been kept fully occupied constructing earth dams. It is interesting to note that weir construction shows a bigger percentage increase than earth dams constructed by farmers and contractors.

A departmental fleet of earthmoving units, which operates on a working account, is spread fairly widely over the country. Most of the dams built in Mashonaland, and financed either by the Farm Irrigation Fund or the African Loan Fund, were constructed by these units; despite rising costs, the account broke little better than even. A major exercise in reorganization is necessary if this section is to continue to serve the farmer in this field; the recommendations submitted on steps to be taken in this regard are under consideration.

Interest in the covered shell reservoir developed by an officer of this Department in Manicaland is still confined to that province. Nevertheless, a considerable potential exists for this type of reservoir. It is particularly well suited for the storage of potable water from roofs, rock bosses and other hard surfaces where no other water-supplies are close at hand.

Rhodesia has always been proud of its achievements in water conservation. A season such as the past one serves to emphasize that only the surface has been scratched. In order to achieve stability in farming, an accelerated programme of water development and utilization should be embarked upon, and accorded the highest priority. The emphasis should be focused on the development of stock watering-points and farm irrigation schemes, designed first and foremost to augment rain and thus ensure stability in summer crop production. This can best and most effectively be achieved by a very substantial expansion of the Farm Irrigation Fund.

Irrigation

The severe drought, coupled with high temperatures and restricted water-supplies, greatly reduced the yields of irrigated crops. Extremely cold winter conditions and frosts in June adversely affected virtually all winter crops, with the exception of deciduous fruit in the highveld, where an improvement, both in quality and in quantity, is expected as a result of "winter chilling".

Many farmers reaped low yields from their summer crops. Having planted areas too large to be adequately catered for by available water-supplies, they attempted, unsuccessfully, to "keep the crop going" with light waterings until the advent of the rains. It is difficult to convince irrigators that the magic concept of summer supplementary irrigation is a myth in low-rainfall areas or during seasons of poorly distributed rain. Departmental advice has always been to establish as large an acreage of summer crops as early as water-supplies will permit. Thereafter, irrigation must be confined to an area the size of which is determined by the capacity of water resources and equipment, but which must be such that adequate soil moisture conditions can be maintained, irrespective of rainfall.

The rather low yields of irrigated crops this summer indicate that too many farmers planted areas grossly in excess of their water-supplies and, in consequence, were unable to do more than keep these large areas of crops alive. The critical water shortage throughout the country resulted in a drastic reduction in the acreages of winter crops grown under irrigation. Some irrigated crops failed when the water-supplies were cut off on African schemes in Manicaland. (See Appendix IX: Table 5. Crop returns from Tribal Trust Land irrigation schemes.)

While not intending to detract from the importance and value of irrigation, the planning, development and use of our water resources should be considered very carefully.

Dry-land agriculture will always be the mainstay of Rhodesia; water development should, therefore, be planned to supplement rainfall, not to replace it, thus synchronizing the utilization of stored water with rainfall.

To achieve this, irrigation development should be distributed as widely as possible, in the interest of the farming industry in general. This can best be achieved by individual farm irrigation development as provided under the Farm Irrigation

Fund. The planning and development of large irrigation schemes must have as their main objective the broadening of the cropping economy of the country and should not be developed to produce crops which will be in direct competition with crops which can be produced under dry-land conditions. The development of these schemes, from an agricultural point of view, must be based on the production of crops which cannot be produced under dry-land conditions.

CROP PRODUCTION

Food crops

Maize

The acreage under maize showed a considerable increase over previous years, possibly due to diversification and an increased interest in the stall-feeding of cattle. The drought seriously affected yields and, although some were ensiled, many dry-land crops were a write-off. It was only to the north of Mashonaland that reasonable dry-land yields were obtained.

Sorghum

Many farmers who had failed to establish a maize crop endeavoured to replace it with sorghum and, although large acreages were planted, little or no yield was obtained. There was a substantial decrease in acreage under this crop in Matabeleland; and yields there were depressingly low.

Munga

This was often the only crop that survived the drought on granite sands in tribal areas, yielding up to three bags per acre and thus avoiding the necessity for widespread famine-relief.

Rapoko

Yields of rapoko in tribal areas were disappointing.

Wheat

Wheat was grown almost entirely as a winter crop and the acreage was similar to that for the previous year, due to the dry summer and lack of irrigation water. Three-fifths of the acreage was grown in the Chiredzi Intensive Conservation Area. The national average yield of 13.4 bags per acre was, however, higher than in previous years.

Barley

This is a minor crop which is grown chiefly in the Manicaland and Victoria Provinces for malting purposes.

Ground-nuts

Ground-nuts were chosen by many farmers as a diversification crop. The poor season, combined with indifferent standards of management, resulted in yields of the order of two to three bags of shelled nuts per acre under dry-land conditions. Irrigated crops fared better, and yields of up to 15 bags of shelled nuts per acre were reported.

Soya-beans

During the year, a competition was held on the growing of soya-beans. Despite the drought, the average yield was 3.8 bags per acre. An increase in the acreage to be planted in the coming season is expected.

Edible beans

This crop failed because of drought, and only insignificant yields were obtained. Frost killed many of the irrigated winter crops grown in the Sabi Valley and the lowveld.

Rice

Rice was grown on a fair acreage under irrigation in the lowveld. In the past, rice has been grown chiefly by Africans under systems of shifting cultivation. Although 7,800 lb. per acre were obtained from 10 acres of paddy on one farm, yields were adversely affected generally, chiefly because of difficulties with irrigation equipment.

Potatoes

The acreage planted to potatoes increased slightly but the summer rain-grown crop was hit by drought in parts of the country and small, poor quality tubers were produced.

Other food crops

Small quantities of *nyimo* and other crops were grown.

Cash crops

Cotton

There was a marked increase in acreage planted to this crop and, despite the effects of the drought, reasonable yields were recorded under dry-land conditions. The introduction of new techniques,

such as water-planting, resulted in crops being grown successfully at altitudes in excess of 4,000 ft. As this technique spreads, a larger acreage is likely to be established at high altitudes. Many former tobacco farmers are now growing cotton and are succeeding in reaping as much as 3,000 lb. per acre where drought is not a hazard. Cotton is becoming increasingly popular with African growers also, and its profitability is encouraging many to buy their own spraying equipment.

One encouraging aspect this year was the high standard of pest-control in all parts of the country; this resulted in a relatively high-quality cotton being marketed.

Tobacco

The tobacco crop produced during the season can be described as the worst-quality crop produced within memory. The reason for the poor quality was the disastrous weather, which affected the three types of tobacco grown.

The importance of burley and oriental tobacco to the African farmer, even in a season like this one, must not be forgotten. In the Midlands and Victoria provinces African oriental growers were, at least, able to sell something.

Cigar-filler tobacco is being grown by 13 farmers this coming season, and it will be interesting to see how this crop grows.

Sugar-cane

In addition to the main cane-growing areas of the lowveld, cane is grown commercially in Chipinga, where 30 to 40 tons per acre are produced from 600 acres.

Pyrethrum

This was affected by drought at Inyanga. Trials have commenced on two more estates.

Sunflowers

Other than in the Midlands, where fairly large acreages were grown, sunflower acreages were low and yields ranged from two to four bags per acre.

Horticultural crops

Apples

The cold winter was extremely beneficial to this crop, and fruit set for the coming season is good. Boron applications in the Inyanga area have improved quality, and 9,000 new trees have been established there.

Peaches

Good yields of high-quality peaches were obtained during the past season, but there was a glut of fruit. Yields of dessert peaches ranged from two to three tons per acre, and in excess of three tons for clingstones.

Other deciduous fruit

Apricots grown below 5,000 ft. suffered from delayed foliation. Good yields of nectarines were produced in Umtali South Intensive Conservation Area. Seven hundred new plum-trees were established in Melsetter.

Citrus

Heavy frost damage was sustained by citrus-trees in Umtali and the Mazoe Valley, while slight damage was reported from other areas.

Pawpaws

The bulk of the country's canning and jam requirements continue to be supplied by the Nyanyadzi Irrigation Scheme, but lack of water has reduced output and only 55 tons were sold this year.

Bananas

Much of the banana acreage was affected by frost and yields were generally low.

Avocados

Commercial production of avocados is confined to the Melsetter Intensive Conservation Area, where some 2,500 trees have been established. The crop is marketed locally and fetches from 8s. 6d. per tray upwards.

Strawberries

Few large commercial growers exist in this country, most strawberries being produced on a market garden scale. A few growers produced up to 30 acres, especially for processing into jam.

Other berried fruits

Small acreages of gooseberries and raspberries are grown in the Eastern Districts.

Viticulture

Vines are grown almost exclusively in the Umtali North Intensive Conservation Area, and in

parts of Matabeleland and Mashonaland, where a significant increase in interest in this crop has been shown and some 120,000 vines have been established to date. In addition, 56,000 cuttings have been imported for establishment. The present trend is towards wine grapes, and just a few selected varieties are planted. A farmer near Bulawayo produced 4,000 gallons of wine this year. Wine was also processed in Umtali.

Nut crops

Interest is increasing in the growing of macadamia and pecan nuts, and some nurseries are bulking up supplies to meet the demand. Unfortunately, 800 four-year-old Macadamia trees were frosted to the ground in Matabeleland, but shooting has since commenced.

Vegetables

Acreages were curtailed by water shortages. In addition, frost killed many vegetable crops, with the result that market prices rose considerably during July and August. Fair-sized acreages of tomatoes were grown for processing, but high losses caused by sun-scorch were reported. Green peas are becoming popular with farmers in Manicaland, where dairy farmers use the pods and hay as cattle-feed.

Some 300 acres of cucurbits were interplanted between citrus in the lowveld, mainly for export to Johannesburg.

Flower and vegetable seed production

Small acreages of flowers were grown for seed. Tomatoes, lettuce and beans were also grown for this purpose, particularly in the lowveld. Seed beans in the Sabi Valley were badly affected by frost.

Tea

In the Holdenby Tribal Trust Land, in Manicaland, 76 acres of tea have been established by African farmers, 14½ acres being already in production. The only other area where African-grown tea has been established is Chipinga. It is in this area that tea is grown mainly by large companies, but considerable interest has been shown by private farmers, who have planted 410 acres and have established nurseries to provide for a further 1,000 acres. Up to the present, approximately 3,500 acres of tea have been established in this country, and yields of 1,000 lb. of green leaf per acre are now common.

Cocoa

Seed was obtained from Malawi, and planted out for trial in the Holdenby and Ngorima Tribal Trust Lands. Unfortunately, all but a few plants in the latter area were destroyed by frost; valley bottoms will obviously have to be avoided where frost is ever likely to be encountered. Further plantings are planned.

Coffee

This crop continues to receive tremendous interest in the Vumba, Melsetter and Chipinga areas of the Eastern Districts. Chipinga farmers were the hardest hit by frost, where 200 acres of young trees were severely affected; cherry damage was moderate to severe. During 1967, 400,000 lb. of coffee was sold, which represents a 1,000 per cent. increase over the figure for 1964. Prices have been fairly stable between £340 and £350 per ton.

Ten acres of coffee are now established in the Holdenby and Manga Tribal Trust Lands, and a slight increase has taken place in the Ngorima Tribal Trust Land. Thirty-four growers in the Chipinga district have 25 acres of coffee, 15 of which are producing cherry.

Fodder crops

Fertilized pastures are becoming increasingly popular, especially in Manicaland. Lucerne is grown for sale to stock-feed companies and also for fodder. Small acreages of oats, jack-beans, sunflowers and soya-beans were also grown for stock consumption on the farm. The drought reduced the yields of maize for silage.

Scope for territorial expansion based on veld and ley pastures in the high-rainfall areas is high—estimated at plus or minus 40 per cent.

An exercise to determine the degree of overstocking in the Matabeleland European farming areas, in relation to watering-points, established that only 60 per cent. of the grazing can effectively be used by stock. It may be concluded, therefore, that, with full development, considerable scope exists for the increase of the present numbers of stock. This assumes that the grazing areas in the low- and medium-rainfall areas of the country are correctly stocked in relation to existing development.

Considering the national production figures, in relation to what can economically be achieved

under sound systems of stock and veld management supplemented with protein during winter, it is quite obvious that only the surface is being scratched. There is no reason why an 80 per cent. rate of reproduction and a marketing age of two and a half to three years should not be achieved.

Until such time as the above rates of reproduction are achieved from cattle and the natural veld, there is little economic justification for embarking upon more expensive, intensive systems of beef production.

LIVESTOCK

Beef production

Grass growth was limited during the summer, and summer weight gains were consequently reduced. The shortage of bulk material during the subsequent winter led to many difficulties on many farms and ranches. Water shortages in some areas have been more serious than the shortage of grazing and, in many cases, water has had to be transported. It is, therefore, somewhat surprising to report that increases in calving and weaning percentages were recorded in Matabeleland and Manicaland, in particular. These improved results could be attributed to destocking during the previous drought. To some extent, the process of destocking has continued this year, particularly in the Midlands.

Supplementary feeding is rapidly becoming an integral part of management on many farms, and the upward trend continues. The tendency still remains, however, to look upon supplementary feeding as a means of preventing mortality rather than of increasing production, with the result that some farmers tend to be over-conservative about feed quantities and quality.

It is reported that 60 per cent. of the breeding stock in the highveld areas of Matabeleland is receiving supplementary feed, and that this is having a marked effect on weaning percentages and weight. The percentage of breeding stock receiving extra feed is as high as 60 to 80 per cent. in some intensive conservation areas, while in others it is far too low at 12 to 30 per cent.

The need for supplementary phosphate in summer is gaining acceptance, but is still far from widespread.

Despite the improvement in the price relationship between beef and crop products in recent years, the relative profitability of crop in relation to stock farming remains very definitely in favour of crop farming in the high-rainfall areas of the country.

In view of this, it must be accepted that the natural veld, augmented with crop residues, forms the basis of economic beef production in Rhodesia. Until such time as the potential of the natural veld has been fully exploited by the adoption of sound veld control and improvement practices (which call for the development of adequate and well-distributed watering-points and paddock fencing) there is no economic justification for embarking upon intensive systems of production based on, for example, irrigation and highly fertilized pastures.

The fact that breeding and growing out of stock offers greater security to the producer, and that the transfer of stock from the ranching areas is unlikely to come into extensive use, it is evident that future systems of production in the high-rainfall areas would tend toward vertically integrated enterprises which will breed and finish their own stock.

The tendency to search for the wonder breed persists, and this results in the attitude that one can breed one's way out of trouble rather than pay additional attention to the basics of management and feeding. Clearly defined breeding policies are often lacking. Cross-breeding and grading-up are common practices, but these policies are, regrettably, far too infrequently accompanied by selection on performance. It is in this context that the very wide acceptance of the Beef Recording Scheme could draw attention to some of the fundamentals of management and selection. Very few farmers practise even the simplest form of recording.

The Beef Recording Scheme continues to attract interest from farmers and the total membership of the scheme now stands at 158. The increase in interest has been attributed largely to the introduction of the Bull Approval Scheme, which requires that participants must become members of the Beef Recording Scheme.

The Livestock Improvement Committee continued to discharge its responsibility to consider applications for the import and export of breeding stock, and the allocation of currency connected with imports. Details of breeding stock imported and exported are reflected in Appendix III.

Fattening

There appears to be a trend away from high-energy feeding to more conventional systems involving the use of a greater proportion of roughage.

In spite of the poor cropping season, cattle-fattening continues to advance in African areas.

The number of cattle being fattened in pens in the tribal areas (4,024) is some 1,400 less than last year. This is due to the difficulty of obtaining home-grown feed, but, in spite of this, 2,367 penned cattle had been sold through the Cold Storage Commission at the end of September, as against 1,226 head at the end of September last year. The figures for penned cattle do not include grades below G.A.Q., as can be seen in Appendix IX, Table 3.

Dairy production

In general, farmers have countered the effects of the drought by buying in more food. The cost of production will, therefore, have risen, whilst the level of production has been more or less maintained.

Dairy production is expanding, both in size of herds and with new producers in the Midlands and Mashonaland—this in spite of warnings on the adequacy of supply. Big producers tend to manage well, whilst small producers are inclined to have a lower standard of management.

Sheep

Increased interest is generally reported and many requests for advice are received. Sheep farmers are increasingly aware that sheep must be managed properly if they are to be profitable.

The dry conditions have tended to favour sheep, and they have had a good year, although the absence of a green bite in the spring is being felt.

In the purchase and tribal areas, probably the most significant change is a steady increase in dosing and inoculations, but management is still at a low level.

Pigs

Pig production tends to remain static and the level of management is high. There is not a great deal of call for extension services in this field, due, no doubt, to the good service provided by the Pig Industry Board.

Widespread interest exists in African areas but management levels tend to be very poor.

Fish

Fish production is one of those enterprises in which interest is easily stimulated. In farming areas, fish is used chiefly for feeding labour but

a number of farmers, both in the farming and in the tribal areas, make an enthusiastic start and then fade out.

Rabbits

In this field, most interest and expansion is in African areas, where this form of protein production could be very useful indeed. The demand for advice is continuous and is increasing.

Bee-keeping

In spite of the drought, the past year has been a good one for honey, more than 100 tons having been produced, as against 30 tons last season.

Advisory work undertaken by the Apiculturist included visits to more than 500 bee-keepers, farmers and merchants, while more than 300 apiaries were inspected. Twenty-two lectures, supported by films, slides or demonstrations, were given to various groups, including women's associations and schools interested in bee-keeping. About 70 meetings and discussions and 20 field-days, where hive demonstrations were given, were attended. Fifteen survey-investigations were carried out.

Pests and weeds

A total of 5,087 inspections were made, under the Plant Pests and Diseases Act, 1958, and the Noxious Weed Act [Chapter 190]. Fifty-eight resulted in successful prosecutions. In addition, the tobacco transshipment sheds and private tobacco storage sheds in Beira were inspected six times at the request of the Tobacco Trade Association.

Lantana camara is still a problem in many areas.

Water hyacinth and *Salvinia auriculata* have been discovered in some rivers, and steps to eradicate these plants continue.

FIELD TRIALS AND DEMONSTRATIONS

Critical trials

A number of critical trials were conducted by the Department on behalf of the Department of Research and Specialist Services. These are reflected in Appendix VIII. A complete report on these trials is being prepared and will be published separately.

Test demonstrations in tribal areas

Results of test demonstrations in Tribal Trust Lands are collated in Appendix IX, Table I. Although most demonstrations were badly affected by the drought, farmers were, generally speaking, favourably impressed by the growth of crops on fertilized plots. Test demonstrations as originally conceived are fast falling away, particularly in the two Mashonaland provinces, where rotational demonstration trials have largely replaced them.

A further departure from traditional test demonstrations was instituted as a localized farming competition in Mashonaland North. The interest in this competition was beyond expectation. It is believed to have encouraged many farmers to put a greater effort into their lands and to have helped to increase the production of crops among competitors. Similar competitions have been arranged for that area during the coming season.

Test demonstration plots in tribal areas fell below expectations, due to the poor season. In parts of Manicaland and Mashonaland North, however, maize yielded 10 bags per acre, which is promising, in view of the conditions. In spite of the drought, cotton yields varied from 643 lb. to 2,500 lb. per acre, and it is confidently expected that, given a normal season, good yields can be obtained by African farmers. Appendix IX, Table I, details the test demonstration plots laid out in tribal areas.

CONCLUSION

The past year has been an extremely hard one for the agricultural industry, one in which ingenuity, fortitude and perseverance in the face of adversity have been sorely tried.

The problems of diversification were insignificant when compared with the widespread drought which affected all aspects of agricultural production, but this must be accepted as an inescapable natural phenomenon to which farming must be adjusted if the industry is to survive. Forward planning and the practising of conservation farming offers the best safeguards in combating and surmounting its effects. However, the fact remains that relief measures will be necessary from time to time in case of disastrous droughts.

Money which is likely to be spent on drought-relief should be made available before the advent of the crisis, to help and encourage farmers to safeguard themselves against the hazards of

drought—and to consolidate and improve their position to face periods of crisis on their own.

This can be achieved by designing schemes which will encourage water development and the establishment of fodder banks. While crop farming for cash cropping purposes is hazardous and uneconomical in the low- and medium-rainfall areas, it can make a very valuable contribution toward stabilizing livestock production if it is designed to supplement the veld and as an insurance against drought. Fodder crops can be produced in most years and, if preserved in the form of silage—the only practical way of establishing a fodder bank—it can be used at any future date, at the discretion of the farmer.

Regrettably, many farmers do not observe sound principles of veld utilization, and when they run into trouble they expect Government to help. These farmers must realize that the country cannot entertain the idea of subsidizing past abusive systems of land use in times of drought.

Any farmer who has overstocked and neglected to build up a fodder bank where it has been possible for him to do so, prior to a drought, should be debarred from all forms of financial assistance which may be offered during a drought year.

The plans which had been laid for the 1967-68 cropping season were well laid. Farmers had prepared themselves and their lands to harvest what could have been a record crop over the whole range which had been introduced as a result of the necessity to diversify. It is singularly unfortunate and tragic that the season proved to be one of the worst, and the drought the most widespread within the memory of most farmers in this country. The optimism, courage and resilience of

the farming community in the face of adversity is deserving of the greatest admiration. As on many other occasions, the farming community has shown its adaptability and fortitude to weather the storms of adversity. Their recovery from this devastating drought will be worthy of the highest praise and will demonstrate to the world the exceptional qualities of the Rhodesian farmer.

In many ways the farmers constitute a body of men who, though hampered in their efforts, are prepared to contribute honestly to the total national service. The security of the farming community should be entrenched as vital to the achievement of security for the nation; there can be no social security for the people of Rhodesia unless it is fully shared by the farmers. The essence of security for the farmer is a reasonable return for his products and the maintenance, conservation and improvement of his enterprises.

I would like to acknowledge, with thanks, the collaboration and help we have received from the other departments and ministries with whom we work, and, in particular, I am especially appreciative of the co-operation we have had in working with those bodies which are outside of Government—intensive conservation area committees, farmers' associations, the Rhodesia National Farmers' Union, and many others.

To my own staff, I would like to pay tribute and record my sincere appreciation of their loyal support and their devotion to duty during a most difficult period in the history of agriculture.

J. H. H. LOUWRENS,

Director of Conservation and Extension.

VISITS TO OTHER COUNTRIES

1. Mr. J. Ball, Mr. P. Maiten and Mr. A. Pilditch undertook a two-week study tour of irrigation schemes in the Eastern Transvaal.
2. Extension Assistant Charamba went to England in September to spend a year at Merrist Wood Farm Institute.
3. Youth Extension Supervisor Chareka returned in July from Merrist Wood Farm Institute, where he had been studying for a year.
4. Mr. F. P. B. du Toit, Senior Farm Building Architect, accompanied officials of the Grain Producers Association of the R.N.F.U. and the Grain Marketing Board on a tour of the South African maize triangle to study bulk handling of maize.
5. Mr. B. D. Elkington and Mr. J. Hayward attended a seminar on communications at Pretoria University during March. The seminar was organized by the South African Institute for Agricultural Extension.
6. Mr. J. Hayward accompanied Mr. Elkington to the Communications Seminar in Pretoria (see 5, above).
7. Mr. M. A. Keech attended the 11th Ordinary meeting of S.A.R.C.C.U.S. in Johannesburg during September, and acted as rapporteur on farm business management.
8. Mr. J. H. H. Louwrens also attended the S.A.R.C.C.U.S. meeting in September. During August he accompanied Mr. G. Rowe to Gordon's Bay where they attended the annual general meeting and conference of the South African Institute for Agricultural Extension. Before returning to Rhodesia, Mr. Louwrens visited some of the universities in South Africa.
9. Mr. MacDermot, the extension officer for the Holdenby Tribal Trust Land, visited Malawi, where he studied the Tea Authority. Whilst there he took the opportunity to visit the Tea and Coffee Research Station.
10. Mr. P. Maiten spent two weeks studying irrigation in the Eastern Transvaal (see 1, above).
11. Mr. T. A. Murton represented the department at a S.A.R.C.C.U.S. meeting in Angola.
12. Mr. G. Oliver, of Engineering Branch, together with Mr. P. R. S. Stead, went to South Africa in November, 1967, to study methods of ground-nut production.
13. Miss P. Papadopoulos spent five weeks in South Africa, visiting bee-keepers, attending conferences, giving lectures and making advisory calls.
14. Mr. A. Pilditch studied irrigation for two weeks in the Eastern Transvaal (see 1, above).
15. Mr. W. R. Robertson studied for a M.Sc. degree in Agricultural Economics at Aberdeen University whilst on study leave.
16. Mr. G. Rowe, together with the Director, attended the annual general meeting of the South African Institute for Agricultural Extension at Gordon's Bay. Mr. Rowe writes that it is interesting to note that, while we regard the present coverage of the country, on a ratio of one extension officer to 150 to 200 farmers scanty, the equivalent service in the Republic operates on a ratio of one to a thousand or more farmers, with each extension officer serving five or six committees. Another striking difference is the almost complete absence of in-service training as we know it in Rhodesia.
17. Mr. P. R. S. Stead, Work Study Officer, went to South Africa, with Mr. G. Oliver, to investigate methods of ground-nut production.
18. Mr. J. L. Stocks, Tobacco Officer, visited America, Canada, France, Switzerland and Italy on an Archie Henderson Memorial Trust grant.
19. During a private visit to North America, Mr. A. T. Stubbs undertook a brief study tour in Canada and the United States.
20. Mr. R. Törnbohm was in the Rhodesian delegation at the S.A.R.C.C.U.S. meeting in Johannesburg, and was rapporteur for conservation education.
21. Mrs. P. Turnbull-Kemp, Women's Training Officer, visited South Africa during March and studied the workings of the Home Economics and Dietetic Services in the Department of Agricultural Technical Services, the universities and in related agencies.
22. Mr. J. M. Watermeyer attended a three-day symposium on irrigation in Pretoria.
23. On vacation leave, Mr. B. B. Wilson visited various fruit research organizations in England and South Africa. He also visited farms and marketing organizations.

PUBLICATIONS

Title	Author	Publication
Your sheep and that grass seed problem . . .	Bedford, R. E. R.	<i>Rhodesian Farmer</i>
Dosing and supplementary feeding of steers . .	Bembridge, T. J. and Trace, C. G. N.	<i>Rhodesia Agricultural Journal</i>
Control of thorn-trees can double veld capacity . . .	Bembridge, T. J.	<i>Modern Farming</i>
The integration of cotton with tobacco . . .	de Jong, J.	<i>Rhodesia Tobacco Journal</i>
A guide to cotton reaping . . .	de Jong, J.	<i>Rhodesia Tobacco Journal</i>
Care of your stock during a drought . . .	Donkin, D. J.	<i>African Times</i>
Lambing season . . .	Donkin, D. J.	
Sheep on the tobacco farm . . .	Donkin, D. J.	<i>Rhodesia Tobacco Journal</i>
Grading-work-study aspects of flue-cured tobacco production, Vol. IV . . .		
Planning for tobacco farm management efficiency . . .	Duncan, B. H. G.	Departmental
Kurt machine reaping—the correct way . . .	Duncan, B. H. G.	<i>Tobacco Forum</i>
Tobacco grading . . .	Duncan, B. H. G.	<i>Modern Farming</i>
A guide to labour and tractor planning . . .	Duncan, B. H. G., and Stead, P. R. S.	<i>Tobacco Forum</i>
Construction of horizontal silos for silage— A review of literature . . .		<i>Rhodesia Agricultural Journal</i>
Structure for green coffee processing . . .	du Toit, F. P. B.	Departmental
Wire mesh grain silos . . .	du Toit, F. P. B.	Departmental
Small arch weirs . . .	Elwell, H. A.	Departmental
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Site selection for dams . . .	Elwell, H. A.	Handbook
Material for dam construction . . .	Elwell, H. A.	Handbook
Use of material in design . . .	Elwell, H. A.	Handbook
Tobacco management records—1965-66 . . .	Farm Management Section and Economics and Markets Branch	Departmental
The Beef Recording Scheme . . .	Gammon, D. M.	<i>Rhodesian Farmer</i>
Beef production in intensive areas . . .	Gammon, D. M.	<i>Farming Opportunities in Rhodesia</i>
Supplementary feeding . . .	Gammon, D. M.	<i>Rhodesia Tobacco Journal</i>
Production systems . . .	Gammon, D. M.	<i>Rhodesia Tobacco Journal</i>
Breeding policies . . .	Gammon, D. M.	<i>Rhodesia Tobacco Journal</i>
Veld management . . .	Gammon, D. M.	<i>Rhodesia Tobacco Journal</i>
Calving season . . .	Gammon, D. M.	<i>Rhodesia Tobacco Journal</i>
Cattle management . . .	Gammon, D. M.	<i>Rhodesia Tobacco Journal</i>
Vegetable growing . . .	Going, W. D.	Departmental
Care in reaping can avoid "black" tobacco . .	Hayward, J. W.	<i>Modern Farming</i>
Veld management—Where to from hence? . .	Hill, J. C. R.	<i>Rhodesian Farmer</i>
Sunflowers . . .	Howden, R. H. G.	<i>Rhodesia Tobacco Journal</i>
The cultivation of soya-beans . . .	Howden, R. H. G.	<i>Rhodesia Tobacco Journal</i>
A new look at rice for Rhodesia . . .	Howden, R. H. G.	<i>Modern Farming</i>
Calibration chart for dusters . . .	Jones, M. E.	Departmental
Aim must be to reap all lower leaves . . .	Kille, T.	<i>Modern Farming</i>
Recommendations for burley tobacco . . .	Kille, T.	<i>Modern Farming</i>
Burley: fertilization, plant population and white mould . . .	Kille, T.	<i>Rhodesia Tobacco Journal</i>
To sell or not to sell your quota . . .	Kille, T.	<i>Rhodesia Tobacco Journal</i>
How Conex assists the tobacco farmer . . .	Kille, T.	<i>Rhodesia Tobacco Journal</i>
Grading burley . . .	Kille, T.	<i>Rhodesia Tobacco Journal</i>
Grading burley . . .	Kille, T.	<i>Rhodesian Farmer</i>
Pilot scheme for grading and selling African burley . . .	Kille, T.	Forum
Burley important cash crop for African farmers . . .	Kille, T.	<i>Tobacco N.Y.</i>
Articles on burley . . .	Kille, T.	Murimi
White mould, methods of control explained . .	Milligan, G.	<i>Modern Farming</i>
Thoughts to aid the tobacco crop this season .	Milligan, G.	<i>Modern Farming</i>
The loss of leaf in some Rhodesian crops . .	Milligan, G.	<i>Rhodesia Tobacco Journal</i>
Victoria grows everything from coffee to cactus . . .		
Hopper mechanism of Duly planter investigated . . .	Murton, T. A.	<i>Property and Finance</i>
Competition ploughing technique . . .	Oliver, G. J.	<i>Modern Farming</i>
The art of ploughing . . .	Oliver, G. J.	<i>Rhodesia Tobacco Journal</i>
Rhodesian trees, shrubs and flowers flowering during November . . .	Oliver, G. J.	<i>Rhodesia Herald</i>
Rendering old combs . . .	Papadopoulos, P. (Miss)	Departmental
	Papadopoulos, P. (Miss)	<i>The Bee Line</i>

APPENDIX II (Continued)

<i>Title</i>	<i>Author</i>	<i>Publication</i>
Bee-keeping for profit (revised)	Papadopoulos, P. (Miss)	Bulletin No. 2187
Protecting supers against wax moth (revised)	Papadopoulos, P. (Miss)	Bulletin No. 2246
Rendering your beeswax (revised)	Papadopoulos, P. (Miss)	Bulletin No. 2213
Rhodesian trees, shrubs and flowers flowering during December	Papadopoulos, P. (Miss)	Departmental
Solar wax extractor	Papadopoulos, P. (Miss)	<i>The Bee Line</i>
Storing supers	Papadopoulos, P. (Miss)	<i>The Bee Line</i>
Preparation for winter	Papadopoulos, P. (Miss)	<i>The Bee Line</i>
Enemies of bees	Papadopoulos, P. (Miss)	<i>The Bee Line</i>
Enemies of bees, Part II	Papadopoulos, P. (Miss)	<i>The Bee Line</i>
Enemies of bees, Part III	Papadopoulos, P. (Miss)	<i>The Bee Line</i>
Enemies of bees, Part IV	Papadopoulos, P. (Miss)	<i>The Bee Line</i>
Bees, pamphlet	Papadopoulos, P. (Miss)	Departmental
Pure honey, pamphlet	Papadopoulos, P. (Miss)	Departmental
Enemies of bees, Part V	Papadopoulos, P. (Miss)	<i>The Bee Line</i>
Pure honey	Papadopoulos, P. (Miss)	Manicaland Agricultural Show Supplements
Summary of enemies	Papadopoulos, P. (Miss)	<i>The Bee Line</i>
Diseases	Papadopoulos, P. (Miss)	<i>The Bee Line</i>
No. 1	Papadopoulos, P. (Miss)	<i>Flowering Bulletin</i>
No. 2	Papadopoulos, P. (Miss)	<i>Flowering Bulletin</i>
No. 3	Papadopoulos, P. (Miss)	<i>Flowering Bulletin</i>
No. 4	Papadopoulos, P. (Miss)	<i>Flowering Bulletin</i>
Review of a leaflet on bee-keeping for African women prepared by the Rhodesia Council of Social Services	Papadopoulos, P. (Miss)	
Work study on ground-nut production	Stead, P. R. S.	Departmental
The monkey-nut in the Republic	Stead, P. R. S.	<i>Rhodesian Farmer</i>
The soya-bean competition	Stead, P. R. S.	<i>Rhodesian Farmer</i>
Ground-nut planting	Stead, P. R. S.	<i>Rhodesian Farmer</i>
The stockman can counter the effects of the drought	Stubbs, A. T.	<i>Rhodesian Farmer</i>
Some thoughts on cattle-feeding during drought	Stubbs, A. T.	<i>Modern Farming</i>
Feeding cattle in hard winters	Stubbs, A. T.	<i>Rhodesia Tobacco Journal</i>
Peach picking and packing	Wilson, B. B.	

The following articles for the revised Agricultural Handbook have been received from the printers:

Instructions for taking soil samples.
Simplified soil profile criteria for assessment of irrigable soils.
Illustrative detailed consideration of motor-car costs.
General background to farm management.
Description of some useful management records.
An introduction to the more important terms and principles applicable in management.
Consideration of the problems in improving farm management in Rhodesia.
Legume inoculation.
General fertilizer recommendations.
Efficient use of fertilizer and lime.
Fertilizers: conversion of S.A. nomenclature into Rhodesian.
Rapoko.
Production of oats.
Oats.
Response to early planting and irrigation of ground-nuts.
Sunflower.
Linseed—Flax.
Njugo beans or Bambarra nuts.
Sisal.
New Zealand hemp.

Tea.
Pyrethrum.
Nindi.
Carrying capacity and veld management.
Improved pastures in vleis.
Dryland pastures.
Wedge pea.
Vetch.
Serradella.
Lucerne.
Clovers.
Japanese radish.
Buck-wheat.
Gestation, œstrus, pulse, temperature and respiration.
Clean milk production.
Dairy buildings and equipment.
Pigs.
Poultry husbandry.
Guide to classification of subjects.
Index.

Articles at the printers:

Plant parasitic nematodes.
Important pests and diseases of Brassica crops.
Site selection.
Materials for dam-wall construction.
Use of materials in design.

Birdseed.
Safflower.
Sesame.
Commercial vegetable production.
Kenaf.
Jack-beans.
Dahl-beans.
Kuru vine.
Dairy production.
Sheep production notes.
Goats.

New and revised articles received, but not yet submitted to the printers:

Seeds: formation, production, testing, certification and legislation.

Danger periods of spray residues.

Grain sorghum.

Forage sorghum.

Rye.
Oriental tobacco production.
Ground-nuts.
Castor beans.
Beans.
Peas.
Macadamia production.
Lupins.
Horse marmalade.
Glycine.
Beef production.

In addition, papers were prepared by members of the staff for the International Symposium on Soil Tillage in the Tropics, the Symposium on Animal Production and an article was published in "Tobacco", in New York, publicising the work done by Conex. Reports have been issued on various farm equipment and on land protection and land use, particularly in African areas and where slopes are excessive.

APPENDIX III

EXPORTS AUTHORIZED BY THE LIVESTOCK IMPROVEMENT COMMITTEE FOR THE PERIOD NOVEMBER, 1967, TO SEPTEMBER, 1968

Breed	Males	Females
Afrikander	25	445
Brahman	118	35
Brahman x Afrikander	12	50
Friesland	5	75
Hereford	9	4
Red Poll	21	50
Sussex	9	
Simmentaler	1	
TOTALS	270	659

SHEEP AND GOAT EXPORTS

Breed	Rams	Ewes	Lambs	Goats
Black-head Persian	1	—	—	—
Unspecified	14	12	—	—
TOTALS	15	12	—	—

SUMMARY OF IMPORTS AND EXPORTS FOR THE PERIOD OCTOBER, 1967, TO SEPTEMBER, 1968

Breed	IMPORTS				
	Cattle				
	Bulls	Cows	Heifers	Oxen	Calves
Aberdeen Angus	1	—	—	—	—
Afrikander	30	14	—	—	2
Brahman	44	18	25	—	1
Charolais	6	44	10	—	18
Friesland	7	10	—	—	—
Hereford	6	9	10	—	—
Jersey	1	—	—	—	—
Shorthorn	1	8	20	—	—
Simmentalers	6	6	6	—	—
South Devon	3	8	—	—	1
Sussex	4	30	38	—	—
Unspecified	8	54	12	27	4
TOTALS	117	201	121	27	26

Breed	Sheep			
	Rams	Ewes	Lambs	Mixed
Corriedale	—	16	—	—
Dohne Merino	4	160	—	—
Dorper	1	27	—	—
Suffolk	3	5	—	—
Wiltiper	2	—	—	—
Unspecified	113	2,328	29	2,750
TOTALS	123	2,536	29	2,750

Rams	Goats	
8	5	Mixed 217

TRAINING
COURSES RUN AT TRAINING INSTITUTES

Institute	Number of courses held	Training/Trainee days	Participants	
			Conex staff	Others
Alvord	178	14,285	1,229	5,523
Domboshawa	42	3,606	157	1,205
Kayisa	24	3,701	144	701
Rowa	41	3,343	411	425
TOTALS	285	24,935	1,941	7,854

APPENDIX IVB

COURSES ORGANIZED AT DISTRICT AND PROVINCIAL VENUES

<i>Province</i>	<i>No. of courses</i>	<i>Attendance</i>
Manicaland	66	682
Mashonaland North	59	588
Mashonaland South	36	609
Matabeleland	41	410
Midlands	95	321
Victoria	71	1,156

The following are some of the subjects dealt with:
Extension, conservation, rabbits, poultry, gardening, bees, ox and tractor ploughing, agronomy, animal husbandry, oriental tobacco, pegging, young farmers' clubs, irrigation, aerial photography, fish cropping, fertilizers, cotton, burley tobacco, sheep management and grain grading.

SOIL CONSERVATION

Province	Period	Contour ridges and storm-drains										Waterways pegged—miles			Roads pegged—miles		
		Miles															
		Pegged			Constructed (estimated)			Acres protected (estimated)									
		Farming	T.T.L.	Total	Farming	T.T.L.	Total	Farming	T.T.L.	Total	Farming	T.T.L.	Total				
Mashonaland South	1967-68	848	4,590	5,438	846	377	1,223	18,548	7,203	25,751	8	264	272	12	350	362	
	1966-67	—	—	1,435	—	—	1,243	—	—	32,722	—	—	98	—	—	260	
Mashonaland North	1967-68	3,531	5,499	9,030	3,174	2,692	5,866	52,004	50,821	102,825	48	603	651	88	483	571	
	1966-67	—	—	4,999	—	—	3,459	—	—	57,607	—	—	56	—	—	113	
Midlands	1967-68	8,764	418	9,182	8,662	169	8,831	4,847	2,276	7,123	11	103	114	26	61	87	
	1966-67	—	—	1,168	—	—	500	—	—	7,708	—	—	97	—	—	76	
Matabeleland	1967-68	229	530	759	203	228	431	5,247	12,069	17,316	9	531	540	4	29	33	
	1966-67	—	—	554	—	—	294	—	—	10,702	—	—	373	—	—	29	
Manicaland	1967-68	485	686	1,171	497	505	1,002	7,876	4,906	12,782	11	65	76	14	18	32	
	1966-67	—	—	1,699	—	—	1,194	—	—	17,427	—	—	67	—	—	41	
Victoria	1967-68	420	5,743	6,163	342	3,175	3,517	4,159	34,687	38,846	68	451	519	—	—	—	
	1966-67	—	—	1,259	—	—	991	—	—	11,334	—	—	—	—	—	—	
TOTALS	1967-68	14,277	17,466	31,743	13,724	7,146	20,870	92,681	111,962	204,643	155	2,017	2,172	144	941	1,085	
	1966-67	—	—	11,114	—	—	7,682	—	—	137,500	—	—	412	—	—	362	
Increase for 1967-68 over 1966-67		—	—	185 %	—	—	172 %	—	—	49 %	—	—	427 %	—	—	200 %	

WATER CONSERVATION

Province	Period	Number of dams constructed	Capacity in million gallons	
			Total	Average
Mashonaland South	1967-68	78	1,131.8	14.5
	1966-67	21	390.0	18.6
Mashonaland North	1967-68	139	844.6	6.1
	1966-67	97	479.6	4.9
Midlands	1967-68	60	1,240.8	20.7
	1966-67	31	738.0	23.8
Matabeleland	1967-68	64	4,295.2	67.1
	1966-67	34	7,003.4	206.0
Manicaland	1967-68	137	197.0	1.4
	1966-67	64	102.0	1.6
Victoria	1967-68	60	37.0	0.6
	1966-67	33	15.4	0.5
TOTALS	1967-68	538	7,746.4	14.4
	1966-67	280	8,728.4	31.2
COMPARISON: 1967-68 with 1966-67	Increase	92%	—	—
	Decrease	—	11%	54%

N.B.—Weirs are included.

Number of dams constructed: 92 per cent. increase.

DAMS CONSTRUCTED

Province	Year	Farmers and contractors				Government units	
		Earth dams		Weirs		Earth dams	
		Number	Percentage	Number	Percentage	Number	Percentage
Mashonaland South	1967-68	45	58	13	16	20	26
	1966-67	12	57	3	14	6	29
Mashonaland North	1967-68	23	17	5	4	111	79
	1966-67	20	20.6	3	3.1	74	76.3
Midlands	1967-68	39	65	1	2	20	33
	1966-67	11	35.5	1	3.2	19	61.3
Matabeleland	1967-68	32	50	28	44	4	6
	1966-67	12	40	14	46.7	4	13.3
Manicaland	1967-68	120	88	17	12	—	—
	1966-67	57	89	7	11	—	—
Victoria	1967-68	55	92	5	8	—	—
	1966-67	33	100	—	—	—	—
TOTALS	1967-68	314	58	69	13	155	29
	1966-67	145	53	28	10	103	37
Increase for 1967-68 over 1966-67		169	116	41	146	52	50

APPENDIX VIII

CRITICAL TRIALS CARRIED OUT BY THE DEPARTMENT OF CONSERVATION AND
EXTENSION DURING 1967-68

Type of trial	Manica-land	Mashona-land North	Mashona-land South	Matabele-land	Midlands	Victoria	Total
Maize variety	1	3	Nil	Nil	1	1	6
Soya-bean variety	1	3	1	Nil	1	Nil	6
Cotton variety	2	2	1	Nil	Nil	1	6
Cotton fertilizer/spacing	1	1	1	Nil	Nil	Nil	3
Cotton fertilizer/season-length	Nil	1	Nil	Nil	Nil	Nil	1
Ground-nut variety	1	Nil	2	Nil	Nil	1	4
Ground-nut fertilizer	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Grain sorghum variety	Nil	2	Nil	Nil	Nil	1	3
Grain sorghum fertilizer	Nil	Nil	Nil	Nil	1	1	2
Grain sorghum and maize	Nil	1	Nil	Nil	Nil	Nil	1
Harvester termite	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Lime and fertility	1	Nil	1	Nil	Nil	1	3
Herbicide	2	2	Nil	Nil	1	Nil	5
Ground-nut variety/soil type	Nil	1	Nil	Nil	Nil	Nil	1
Rice	1	Nil	Nil	Nil	1	Nil	2
Saline water	1	Nil	Nil	Nil	Nil	Nil	1
TOTALS	11	16	6	Nil	5	6	44

TABLE 1

TEST DEMONSTRATION PLOTS IN TRIBAL TRUST LANDS, BY PROVINCE

Crop	MANICALAND		MASHONALAND NORTH		MASHONALAND SOUTH		MATABELELAND		MIDLANDS		VICTORIA		TOTAL		Mean yield per acre (bags)
	Number of plots	Acres	Mean yield per acre (bags)	Number of plots	Acres	Mean yield per acre (bags)	Number of plots	Acres	Mean yield per acre (bags)	Number of plots	Acres	Mean yield per acre (bags)	Number of plots	Acres	
Maize	48	25	10.6	31	29	10.7	27	50	4.8	124	223	2.9	43	41	6.7
Grain sorghum . . .	32	18	2.8	27	25	8.9	32	17	1.8	144	230	3.0	18	12	4.2
Groundnuts	63	39	2.3	26	24	1.5	16	31	2.3	110	79	2.6	23	21	4.2
Rapoko	—	—	—	—	—	—	11	11	1.2	—	—	—	8	8	6.0
Munga	2	2	0.8	—	—	—	—	—	—	7	19	2.2	40	40	3.1
Cotton (lb.)	30	18	1,125	10	9	1,610	12	8	643	2	1	2,500	5	3	940
Ration beans	—	—	—	—	—	—	—	—	—	9	11	0.9	—	—	—
Sunhemp	—	—	—	—	—	—	—	—	—	3	9	0.6	—	—	—
Wheat	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Nyimo	—	—	—	—	—	—	2	2	1.3	7	9	1.0	—	—	—
Cow-peas	—	—	—	—	—	—	—	—	—	26	29	1.2	—	—	—
Rice	3	1	3.0	—	—	—	—	—	—	1	1	Nil	3	1	24.0
Soya-beans	9	7	2.4	2	1	3.0	4	3	1.8	—	—	—	15	11	2.4
Sunflowers	—	—	—	—	—	—	4	8	3.6	—	—	—	5	9	3.3
Sweet potatoes . . .	—	—	—	—	—	—	1	1	3.1	—	—	—	2	1	—
Velvet beans	—	—	—	—	—	—	—	—	—	1	2	1.0	—	—	—
Burley tobacco (lb.) .	1	1	2,468	—	—	—	—	—	—	—	—	—	1	1	1.0
Oriental tobacco (lb.)	5	1	1,250	—	—	—	—	—	—	—	—	—	22	5	2,468
Potatoes	—	—	—	—	—	—	2	1	Nil	—	—	—	2	1	700
Tomatoes (lb.) . . .	—	—	—	—	—	—	3	1	38,800	—	—	—	3	1	Nil
TOTALS	193	112	—	96	88	—	114	133	—	434	613	—	138	126	—
													1,344	1,832	—

* Less than one acre.

TABLE 2

RECORD OF GENERAL EXTENSION WORK, BY PROVINCE

	Mashona- land North	Mashona- land South	Matabele- land	Midlands	Victoria	Manica- land	Total
Total number of cultivators	68,903	89,908	106,811	88,215	104,441	91,767	550,045
Number of master farmers	800	4,194	792	2,647	5,725	2,005	16,163
Number of master farmers qualifying during year	21	179	30	152	61	95	538
Number of master farmers in training	1,667	1,870	752	1,537	1,788	1,363	8,977
Number of co-operators	11,806	24,561	7,051	31,899	29,315	18,256	122,888
Number of farm carts in use	4,059	7,365	8,410	7,663	7,766	7,677	42,940
Number of farmers using fertilizer	7,698	7,568	2,096	2,450	2,226	6,401	28,439
Number of farmers' days	383	818	330	726	1,324	948	4,529
Number of farmers attending field-days	18,754	41,534	6,721	29,223	41,534	21,021	158,512
Number of agricultural shows	—	6	3	12	14	7	42
Number of training centres in use	58	99	23	110	144	75	509
Number of training centres constructed during year	—	5	—	7	4	1	17
Number of tractors	54	224	103	120	79	114	694

TABLE 3

ANIMAL HUSBANDRY EXTENSION

Province	SUPPLEMENTARY FEEDING				PEN-FEEDING—TRIBAL TRUST LANDS					Number of farmers marketing through C.S.C., Colcom			Number of farmers dosing	
	A.P.A.		T.T.L.							Total cattle in pens	Grade obtained			
	Number making hay	Number making silage	Number making hay	Number making silage	C.I	C.II	C.III	G.A.Q.						
Manicaland	305	18	3,173	64	1,253	6	15	65	523	981	77	390	1,304	257
										N.B.—All stock marketed through C.S.C. by Manicaland farmers.				
Mashonaland North . .	164	6	117	26	170	—	3	11	68	242	—	4	175	35
Mashonaland South . .	383	18	399	49	693	4	9	34	406	553	1	67	637	30
Matabeleland	31	9	142	131	293	1	—	7	259	358	43	180	894	305
Midlands	94	45	144	55	389	—	1	21	280	429	12	5	6,736	2,636
Victoria	457	48	1,509	158	1,226	6	24	58½	565½	1,540	35	284	4,099	1,973
TOTALS . .	1,434	144	5,484	483	4,024	17	52	196½	2,101½	4,103	168	930	13,845	5,236

PURCHASE AREA EXTENSION

Province	Total acreage	Total number of farms alienated	Number of I.C.A.s	Number of farmers' associations	Number of farm plans prepared
Manicaland	250,097	1,296	12	9	17
Mashonaland North	374,877	1,340	14	5	41
Mashonaland South	408,552	1,406	15	8	3
Matabeleland	370,260	747	4	8	194
Midlands	1,106,963	1,541	18	7	65
Victoria	671,850	1,974	20	12	27
TOTALS	3,182,599	8,304	83	49	347

TABLE
CROP RETURNS FROM TRIBAL TRUST LANDS

Province	Number of plot-holders	Acreage under irrigation	Acreage cropped	Maize (200-lb. bags)			Cotton (units of 1,000 lb.)			Wheat (200-lb. bags)	
				Acreage	Total yield	Average yield per acre	Acreage	Total yield	Average yield per acre	Acreage	Total yield
Mashonaland North . .	22	66	88	11	264	24.0	33	120	3.7	—	—
Mashonaland South . .	119	105	104	64	1,840	29.0	40	80	2.0	—	—
Victoria	47	180	152	102	2,283	22.4	12	13.4	1.1	18	—
Matabeleland	1,087	2,097	1,655	1,006	11,676	11.0	22	18.1	0.8	548	5,100
Manicaland	1,678	5,735	8,000	3,482	38,550	11.0	1,110	2,235	2.0	998	5,100
TOTALS	2,953	8,183	9,999	4,665	54,613	11.8	1,217	2,466	2.0	1,564	11,700

Note.—Midlands returns not included.

APPENDIX IX (continued)

IRRIGATION SCHEMES, 1967-68

Crop	Average yield per acre	Ration beans (200-lb. bags)		Average yield per acre	Seed beans (200-lb. bags)		Average yield per acre	Green vegetables (tons)		Average yield per acre	Other seed crops (acres only)	Other crops (acres only)
		Acreage	Total yield		Acreage	Total yield		Acreage	Total yield			
—	—	22	44	2.0	—	—	—	—	—	—	—	22
—	—	—	—	—	—	—	—	—	—	—	—	—
4	8.0	—	—	—	—	—	—	11	165	15.0	—	9
7	10.8	34	114	3.3	—	—	—	10	18.5	1.9	—	35
6	5.3	1,505	1,945	1.3	263	512	1.9	74	85	1.1	73	495
7	7.3	1,561	2,103	1.4	263	512	1.9	95	269	2.7	73	561

ANALYSIS OF HOUR UTILIZATION BY EUROPEAN STAFF

Province/Group I.C.A./A.P.A./T.T.L.	Victoria		Mashonaland North		Mashonaland South		Midlands		Matabeleland		Manicaland		Grand total	Percentage
	Total	Percentage	Total	Percentage	Total	Percentage	Total	Percentage	Total	Percentage	Total	Percentage		
I.C.A. group farmers	2,192	4.7	2,877	4.9	3,312	5.7	2,806	5.5	1,275	1.6	2,045	4.0	14,507	4.2
Staff conferences	2,885	6.2	2,746	4.7	3,346	5.7	3,714	7.5	3,488	4.4	2,668	5.2	18,847	5.5
Courses	3,650	7.9	1,965	3.4	2,954	5.1	2,886	5.8	3,216	4.0	2,500	4.9	17,171	5.0
Inspections	2,384	5.2	4,445	7.6	6,155	10.5	2,507	5.1	3,311	4.1	2,780	5.4	21,592	6.3
Agronomy	3,065	6.6	3,723	6.4	4,164	7.1	3,231	6.5	4,002	5.0	7,688	15.0	25,873	7.5
Tobacco	1,029	2.2	1,332	2.3	629	1.1	739	1.5	74	0.1	1,180	2.3	4,983	1.4
Livestock	4,263	9.2	2,730	4.7	5,194	8.9	3,739	7.5	6,208	7.8	3,747	7.3	25,881	7.5
Soil and water conservation	5,364	11.6	11,308	19.4	10,990	18.8	5,141	10.3	7,653	9.6	5,617	10.9	46,073	13.4
Irrigation	3,669	7.9	1,929	3.3	1,825	3.1	6,652	13.4	21,695	27.2	4,022	7.8	39,792	11.6
Farm planning	906	2.0	2,356	4.1	496	0.8	1,956	3.9	2,271	2.8	899	1.7	8,884	2.6
Farm management	434	0.9	264	0.5	506	0.9	482	1.0	301	0.4	388	0.8	2,375	0.7
Field-day shows	1,514	3.3	2,471	4.2	2,859	4.9	1,667	3.4	1,819	2.3	1,500	2.9	11,830	3.4
Field trials	1,383	3.0	1,108	1.9	1,602	2.7	475	1.0	1,925	2.4	1,586	3.1	8,079	2.4
Census	83	0.2	203	0.4	170	0.3	118	0.2	208	0.3	166	0.3	948	0.3
General extension liaison	4,034	8.7	4,654	8.0	2,606	4.5	4,014	8.1	2,493	3.1	5,464	10.6	23,265	6.8
Administration	9,277	20.1	13,790	23.7	11,373	19.5	9,441	19.0	19,084	23.9	8,513	16.6	71,478	20.8
Publications	155	0.3	270	0.5	218	0.4	144	0.3	813	1.0	604	1.2	2,204	0.6
TOTALS	46,287	100.0	58,171	100.0	58,399	100.0	49,722	100.0	79,836	100.0	51,367	100.0	343,782	100.0

APPENDIX XI

MEETINGS ATTENDED BY CONEX STAFF

HEAD OFFICE STAFF

1. N.R.B. Conservation Education Committee.
2. N.R.B. Water Resources Committee (Assistant Director (Technical)).
3. N.R.B. General purposes Committee (Assistant Director (Field)).
4. N.R.B. Wild Life Conservation Committee (Director).
5. N.R.B. meetings (Director).
6. N.R.B. Tribal Trust Land Committees (Assistant Director (Field)).
7. N.R.B. Mineral Resources Committee (Assistant Director (Technical)).
8. Y.F.C. Council (Director).
9. Y.F.C. executive meeting.
10. Gwebi College Council (Director).
11. Chibero Agricultural College Council (Assistant Director (Field)).
12. Weed-control Committee.
13. Technical Committee on Fertilizer.
14. Henderson Research Station Farm Unit Committee (Assistant Director (Field)).
15. Tsetse Areas Co-ordinating Committee.
16. Fibre Production Committee (Assistant Director (Technical)).
17. Agricultural Assistance Board (Assistant Director (Technical)).
18. Agricultural Loan Fund (Assistant Director (Field)).
19. Agricultural Diversification Scheme Central Committee (Director).
20. Central Committee, F.I.F. (Assistant Director (Technical)).
21. Freedom From Hunger Campaign National Committee (Assistant Director (Field)).
22. Freedom From Hunger Campaign Projects Subcommittee (Assistant Director (Field)).
23. News Dissemination Committee.
24. African Loan Fund Committee (Assistant Director (Technical)).
25. African Farmers' Liaison Committee with Ministry (Director).
26. Rhodesian Agricultural Journal (Assistant Director (Technical)).
27. Oil Seeds Committee (Assistant Director (Technical)).
28. Research Advisory Committee (Director).
29. Hydrological Co-ordinating Committee.
30. Rhodesian Cotton Growers Council (Assistant Director (Technical)).
31. Pasture Seeds and Horticultural Crops Committee.
32. Cotton Aerial Spraying Committee (Assistant Director (Technical)).
33. Seed Production Council (Assistant Director (Technical)).
34. R.N.F.U. Farm Management Committee.
35. Standing Committee on Farm Mechanization (Assistant Director (Technical)).
36. Ministry Show Committee (Assistant Director (Technical)).
37. Field Experiment Committee.
38. Livestock Improvement Committee (Director, Chairman).

39. Farm Buildings Advisory Committee (Assistant Director (Technical)).
40. S.A.R.C.C.U.S. (Director).
41. Mashona Cattle Society.
42. Tuli Cattle Society.
43. Tobacco Research Board (Director).
44. Tobacco Marketing Board.
45. Tobacco Seed Association Executive Committee (Assistant Director (Technical)).
46. Tobacco Seed Association Technical Committee.
47. Burley Tobacco Growers' Association.
48. Oriental Tobacco Advisory Committee.
49. Rural Land Board (Director).
50. Rural Land Board Subdivision Committee.
51. Rural Land Board Finance Committee (Assistant Director (Technical)).
52. Rural Land Board Subcommittee on Land Settlement (Director).
53. Water and Land Development Subcommittee of Sabi-Lundi Authority.
54. Irrigation Co-ordinating Committee.
55. Standards Association of Rhodesia.
56. Ploughing Association of Rhodesia.
57. World Ploughing Association Local Committee.
58. Community Development Training Committee (Domboshawa) (A/D(T)) (Observer).
59. Engineering Committee.
60. Soil's Balance Committee.
61. Seed Planning Committee.
62. Crop Forecasting Committee of Controlled Products.
63. Fertilizer Advisory Committee.
64. Quelea Control Committee.

PROVINCIAL AND DISTRICT STAFF

Manicaland

1. Conservation Education Committee.
2. Y.F.C./N.R. Regional Committee.
3. Freedom From Hunger Campaign Committee.
4. Irrigation Co-ordinating Committee.
5. Drought-relief Committee.
6. Odzani and Umtali River Irrigation Boards.
7. Rhodes Inyanga Orchards Liaison Committee.
8. Fruit Growers' Association.
9. Manicaland Agricultural Society.
10. Inyanga Show Society.
11. Makoni Development Council.
12. Provincial and district committees.
13. F.I.F. regional conferences.
14. Standard attendance at I.C.A. committee meetings.

Mashonaland North

1. Statistical Co-ordinating Committee.
2. Subcommittee to investigate section 14 of the Natural Resources Act [Chapter 264].
3. Agricultural Assistance Board: Technical Advisory Committee.
4. F.I.F. North-east and North-west Committees.
5. Provincial Irrigation Co-ordinating Committee.
6. Provincial Conference in terms of the Prime Minister's Directive.
7. Rhodesia Ploughing Association.
8. Standard attendance of I.C.A. committee meetings.

APPENDIX XI (Continued)

Mashonaland South

1. F.I.F. Committee.
2. Agricultural Assistance Board.
3. Various N.R.B. committees.
4. Central, provincial and district drought-relief committees and assessment teams.
5. Irrigation Co-ordinating Committee.
6. Salisbury Show Produce Committee.
7. Regional Y.F.C.
8. Provincial and district conferences (Prime Minister's circular).
9. Cattle Society meetings.
10. Standard attendance at I.C.A. committee meetings.

Matabeleland

1. Farmers' associations.
2. Road councils.
3. Matabeleland Development Council.
4. Farm Irrigation Fund.
5. Association of Scientific Societies of Rhodesia.
6. Bulawayo Agricultural Society.
7. N.R.B. Trophy Competition Committee.
8. Conservation Education Committee.
9. Regional Freedom From Hunger Campaign Committee.
10. Primary Development Committee.
11. Matopos Research Station Liaison Committee.
12. Provincial Irrigation Co-ordinating Committee.
13. Provincial Drought-relief Action Committee.
14. Rhodesian Horticultural and Crop Seeds Association.
15. Matabeleland Rural Industries Committee.

16. Various R.N.F.U. commodity associations.
17. I.C.A. group and district planning committees.
18. Standard attendance at I.C.A. committee meetings.

Midlands

1. Drought-relief Action Committee.
2. Conservation Education Committee.
3. Y.F.C./N.R. clubs.
4. Freedom From Hunger Campaign Committee.
5. Provincial and district conferences.
6. R.N.F.U. meetings.
7. R.N.F.U. commodity associations.
8. Drought-relief meetings.
9. F.I.F. meetings.
10. Standard attendance at I.C.A. committee meetings.

Victoria

1. Provincial and district conferences.
2. Branch R.N.F.U.
3. Stock Owners' Association.
4. Freedom From Hunger Campaign.
5. Show Society.
6. Conservation education.
7. Y.F.C. Provincial and National Executives.
8. Publicity Association.
9. Standard attendance at I.C.A. committee meetings.

In addition to the above meetings, Conex officers, at Head Office and in the provinces, participate in various organizations such as Rotary, Lions, Round Table, M.O.T.H., Boy Scouts, etc.

Annual Report of the Director of Veterinary Services

for the Year ended 30th September, 1968

GENERAL

IN contrast to the previous year, which was climatically a good one, 1967-68 has proved to be a most difficult season, described by many as disastrous. Promising early rains did not continue, and, by January, drought conditions were already evident.

The following recorded rainfall figures indicate the position:

	1968	1967
Gwanda	9.31	25.51
West Nicholson	6.12	24.74
Beitbridge	6.82	12.23
Victoria	9.9	32.63
Bikita	28.77	60.99
Nuanetsi	7.2	20.56
Zaka	17.3	34.49
Buffalo Range	9.2	25.77
Chipinga district	23.15	50

Most severe winter frosts aggravated the position throughout the country, by killing a high proportion of browse and spoiling much of the available grazing. Livestock in general came through the winter with a minimum number of deaths, but their condition is now poor and late rains or severe cold could cause heavy mortality.

DISEASE

In general, the disease position remained highly satisfactory, except for an outbreak of Newcastle Disease on 19th September—11 days prior to the end of the period covered by this report. There were no outbreaks of foot-and-mouth disease, in spite of its presence in three neighbouring territories. Confirmed cases of rabies dropped from 165 in 1967 to 50 in 1968. Anthrax caused no deaths in livestock, and the large trypanosomiasis problem showed steady improvement in most areas, confirmed smears dropping from 8,134 last year to 6,313 this year. Deaths from tick-borne diseases continued at their normal low incidence. Quarter-evil mortality showed a sharp rise from 151 to 1,190.

STAFF

Professional officers

Our establishment of veterinary officers was increased from 40 posts to 46 posts with effect from 1st July, 1968. The staff position at the end of the year was as follows:

	1964	1965	1966	1967	1968
Establishment	40	40	40	40	46
Fixed Establishment	18	26	23	27	32
Provisional transfer	7	5	4	2	1
Contract appointments	4	3	6	4	2
Vacant posts	11	6	7	7	11

One veterinary research officer (Dr. Matson) resigned and joined the staff of the University College of Rhodesia. We are continuing to provide him with certain facilities, however; so his advice and assistance are still available to the Department. Two of our 19 Government-assisted students completed their year of post-graduate experience and joined the service. Two others are expected in the immediate future, and from early 1969 there will be a steady stream of graduates. In addition, there are 15 other Rhodesian students at various veterinary colleges who are not bonded to Government. The future staff position is, therefore, assured, particularly as the recent salary structure, with a commencing salary of £1,728, rising to £3,060 before promotion barriers are encountered, is reasonable.

Mr. T. Lees May retired from the post of Director on 17th June, 1968, and was succeeded by the Assistant Director of Veterinary Services (Field) Mr. J. M. Williamson. We wish to acknowledge the great energy and enthusiasm of the ex-Director, and his considerable contribution in building the Department to its present high level of efficiency.

Animal health inspectors

The departmental establishment was increased by three posts, giving a total of 104. With only seven resignations and two officers discharged, the position was more stable than for some years. Losses last year amounted to 20. Only 49 per cent. however, have more than six years' experience. The excellent contribution made by this sector of the Department to the routine control of disease cannot be over-emphasized. They work from dawn to dusk on most days, irrespective of the weather, and frequently with very little appreciation from the livestock owners.

Training of animal health inspectors

The Department is extremely fortunate in having a Training Officer with the ability and

enthusiasm of Mr. H. S. de Bruijn, who was appointed to this new position in the latter part of 1966. All recruits are now given an induction course, and other members attend training sessions for a week, as and when disease-control will permit. Sixty-four officers attended refresher courses and 26 others attended special five-day trypanosomiasis instruction. Local two-day courses were also held in all provinces. Two hundred and fifty-six African dip attendants were instructed and given practical demonstrations at dip-tanks at numerous centres throughout the country, as were primary development officers, field assistants, African council members and secretaries, and community advisers.

The demand from appreciative district commissioners has snowballed to such an extent that we are requesting an additional training officer post for this purpose in the coming year.

Meat inspectors

During most of the past 12 months the meat inspection staff has been fully extended to maintain an adequate service in the face of a serious shortage of trained men. One inspector resigned and one was recruited. A veterinary officer was also recruited for this service in August. After experience at Bulawayo C.S.C., he will assume duty at the new C.S.C. Gatooma abattoir when it opens, early in 1970.

Training of meat inspectors

The chronic shortage of staff and the difficulty of obtaining qualified recruits has led to the institution of a Rhodesian training course for meat inspectors at the Bulawayo centre. The course given is the Certificate in Meat Inspection of the Royal Society of Health, London. The first class consisted of seven Veterinary Department trainees and three Cold Storage Commission employees, all of whom successfully sat their examinations in August, 1968. The acquisition of seven more qualified inspectors has considerably eased the staff situation, and a further course is planned for 1969, in anticipation of the new C.S.C. abattoir in Gatooma. The Department's thanks are due to the C.S.C. for the provision of teaching facilities in Bulawayo, the Bulawayo Technical College, the Medical Council of Rhodesia, the Rhodesian Examinations Board of the R.S.H. and, not least, to the R.S.H. itself, for the

successful inception of the C.M.I. training courses in Rhodesia.

Tsetse Control Branch

The administrative staff position still gives cause for concern. No further clerical posts have been created during the year, and it has been necessary to impress professional and technical officers into administrative duties, to the detriment of their more appropriate functions. With the expansion of field operations there is a need for a corresponding increase in our administrative staff. An immunologist has been appointed, against the post of Veterinary Officer, to assist in developing the technique of tsetse blood-meal identification, and one glossinologist post was filled. There have been fewer changes in field officer staff, which indicates that we now are recruiting a more stable and more tolerant type of officer.

OFFICE ACCOMMODATION AND HOUSING

The decision to postpone erection of the new Veterinary Research Laboratories at Hatcliffe until at least 1972 is depressing but, in present circumstances, not unrealistic. The conversion of certain store-rooms on the present site to laboratory space will suffice for immediate needs, though some added office accommodation for Tsetse Branch staff is an urgent necessity.

The new Tsetse Blood-meal Identification Laboratory was officially opened on 10th October, 1968. This is a further advance in the country's general progress to self-sufficiency, and the staff—notably Mr. W. P. Böyt and Mr. P. K. I. MacKenzie, C.V.O. (T.) and Veterinary Research Officer, respectively—are to be congratulated on their initiative.

A new office was completed at Karoi, and staff quarters were built at Mangula and Beatrice. The Diagnostic Laboratory at Bulawayo is nearing completion and, thanks to the generosity of the C.S.C., an excellent laboratory for teaching and meat inspection purposes was provided at the Bulawayo C.S.C. A suitable office building was converted at Marandellas, and a very necessary addition completed at Rusape. Staff quarters at Fort Victoria, Sinoia and Bindura are a priority requirement. Housing for African staff was erected at Gutu, Mrewa, West Nicholson, Gokwe, Marandellas, Macheke and Tjolotjo. Altogether, it has been a year of very reasonable progress.

LIVESTOCK

Beef cattle

Recorded poverty deaths up until 30th September were remarkably low at approximately 7,000—mostly in overstocked areas in the southern Tribal Trust Lands.

Increased interest in beef production continues in all areas, particularly in districts where tobacco was formerly the only horizon. The standard of management is also improving annually, as evidenced by the rise in the sale of our vaccines from 1,388,167 doses in 1967 to 1,891,907 in 1968.

Hereford and Sussex bulls still command the highest prices, though increasing competition from the Charolais breed is evident in the intensive feeding areas. In the ranching districts, Brahman are very evident, and Afrikanders were in greater demand than for some years.

Dairy cattle

This branch of agriculture has suffered more severely than beef producers, due to almost complete crop failures in some districts. Paradoxically, there was an increase of 2,000,000 gallons of milk delivered to the Dairy Marketing Board. The trend of more milk from fewer producers continues.

Sheep

Importations showed a very substantial jump of 4,722 head to 5,260, comparing 1967 with 1968. Many of these animals were imported to establish new breeding flocks, others, mainly rams, to improve existing stock. The average standard of management is improving steadily with the changing attitude of owners, from sheep as a neglected side-line to sheep as a useful source of additional income. Provided that this species receives the necessary basic husbandry of vaccinations against enterotoxaemia, quarter-evil and, depending on the breed bluetongue, and regular parasite-control, deaths should be minimal. The only serious problem encountered has been schistosomiasis (bilharzia) infection.

Goats

Goats—almost exclusively African-owned—have shown a phenomenal increase of 343,926 head. Some means of facilitating the marketing of these animals from the Tribal Trust Lands has been regularly advocated by this Department. We also believe that a great deal of potential income

is lost to owners in these areas by lack of depots where skins and cattle hides can be conveniently sold.

Pigs

Condemnations of pig carcasses for “measles” (*C. cellulosae*) at Bulawayo trebled indicating the larger number of animals being received from free range systems of husbandry in African areas.

The Pig Industry Board appointed its own veterinary surgeon during the year, and it is expected that his concentration on this industry will greatly improve management techniques. Our Department assists him with necessary laboratory facilities.

Poultry

Poultry producers have weathered the problems of sanctions with commendable resource, and are geared for top production when circumstances permit. The quality of stock is excellent and chicken at 3s. per lb. or less is the cheapest “Sunday joint” available. The size of this industry is not generally appreciated, but can be gauged by the fact that, on one property, 11,000 chicks enter the broiler house every three days, and are dressed at nine weeks of age.

To date, the outbreak of Newcastle Disease has not involved any major producer, and prospects of the disease being contained are good.

BORDER-CONTROL

Sabi-Limpopo game-fence

This very important game-fence runs along the border from the Sabi to the Limpopo—109 miles. No attempts were made to smuggle cattle into Rhodesia, but it was cut on one occasion and donkeys were driven into P.E.A. The culprits were speedily arrested by our resident guards, prosecuted and the donkeys were confiscated. Damage by elephant was minimal, and the fence is in excellent repair. Game contact with the southern portion was markedly reduced by an additional game-fence erected by the Ministry of Internal Affairs along the eastern boundary of Buffalo Bend Game Reserve.

Botswana border

The cattle-fence from Plumtree to beacon 171 was well maintained, though the wire is rusting and will have to be progressively replaced. Along

the unfenced section east of Plumtree, 77 cattle and 89 goats were impounded and sent for slaughter at the C.S.C., Bulawayo.

Wankie game-fence

Elephant damage was much reduced this year, and again maintenance was of a high standard.

Kazungula game-fence

Very little maintenance was necessary, following the extensive rebuilding carried out over the previous two years. This fence was extended from Denda Farm to the Lobangwe River—18 miles—thereby preventing game movement from Wankie Game Reserve to Matetsi farms.

TICK LIFE AND DIPPING

The existing Animal Health (Cattle Cleansing) Regulations were revised, to accommodate the service now being given by African councils as a result of community development.

Unfortunately, the standard of tick-control in African areas generally has deteriorated. This can be attributed mainly to—

inexperienced councils and insufficiently supervised dip-attendants, many of whom lack the basic knowledge necessary to maintain efficient dip strengths;

shortage of water, and drought, which have delayed regular weekly dipping until December, and even January in some areas, and terminated it before the end of June;

development of tick resistance to arsenic in many areas, aggravated by the above factors.

As yet, the African areas remain very free from tick-borne diseases, but this position will not continue indefinitely in the face of persistent tick life. The position will not be really satisfactory until responsibility is transferred from the Ministry of Internal Affairs to the Veterinary Department, and funds are made available for adequate supervision and instruction of dip-attendants.

The number of quarantine orders listed below does not reflect the true position because sales were allowed to proceed in many areas which, by normal standards, were tick-infested. The Ministry of Internal Affairs was permitted to fill a dip-tank convenient to the sale-yard with Delnay 1:600, to ensure that all cattle being presented

for sale were tick-free. The desperate need to remove all cattle possible from the overstocked drought-stricken Tribal Trust Lands was of paramount importance.

Quarantine orders for tick-infestation

	<i>European properties</i>	<i>African areas</i>	<i>Total</i>
1967-68	855	898	1,753
1966-67	857	804	1,661

<i>Contraventions</i>	<i>Prosecutions</i>	<i>Total fines £</i>
General Regulations	4	11 10 0
Cattle Cleansing Regulations	908	3,091 5 0
Movement Regulations	83	346 0 0
Rabies Regulations	285	1,328 15 0
Foot and Mouth Regulations	18	126 0 0
Trypanosomiasis Regulations	154	515 0 0
Animal Health Act	90	328 0 0
Stock Register Regulations	39	114 10 0
Import Regulations	1	6 17 3
C. vaginitis and Epid. Regulations	1	2 0 0
Anthrax Regulations	18	53 0 0
	1,601	5,922 17 3
1966-67	1,415	5,687 8 0
1965-66	2,032	8,083 10 0
1964-65	4,168	33,336 5 0

More than half (908) of the total prosecutions (1,601) were for infringements of the Animal Health (Cattle Cleansing) Regulations—mostly for failure to dip or to produce cattle for inspection, due to carelessness. This is in marked contrast to the active opposition and intimidation tactics reflected in the 4,000-odd persons prosecuted in the year immediately prior to independence.

Cattle inspected

<i>District</i>	<i>European</i>	<i>African</i>	<i>Total</i>
Salisbury	1,410,994	1,625,179	3,036,173
Bulawayo	845,905	3,007,271	3,853,176
Umtali	225,730	1,040,316	1,266,046
Gwelo	574,591	1,367,261	1,941,852
Victoria	2,307,792	3,976,025	6,283,817
Sinoia	704,937	336,940	1,041,877
Gwanda	1,005,175	1,902,724	2,907,899
Chipinga	284,521	708,889	993,410
TOTALS	7,359,645	13,964,605	21,324,250
1966-67	6,009,100	11,176,832	17,185,932

The increase of more than 4,000,000 head inspected is due to less disruption of routine work by outbreaks of epizootic disease.

CATTLE SALES

European

There were 409 auction sales on which 163,968 head were sold, an increase of 17,035 on the 1967 figure. This was probably due to the high prices being realized in an expanding industry.

African

Six hundred and seventy-nine weight and grade sales were held by the Ministry of Internal Affairs, at which 79,362 head were sold. This represents 3.17 per cent. of the 2,501,134 African-owned cattle. Admittedly, this figure does not include sales to local butchers or the handful sent direct to C.S.C. abattoirs, but, even allowing a generous additional 2 per cent. for these, the final figure of, possibly, 5 per cent. is pathetic. The removal of excess cattle from the chronically overstocked African areas is the most crucial problem. Complicated as it is with African tradition and custom, the need for draught-oxen, a mass of owners having too few animals to permit of intelligent culling, and a host of other difficulties, its solution is, nevertheless, fundamental to arresting progressive deterioration of the Tribal Trust Lands.

Comparative figures of African cattle sold at the Ministry of Internal Affairs weight and grade sales, expressed as a percentage of the total in that area, are:

District	Total African cattle	Sold	1967-68	1966-67	1965-66	1964-65
Salisbury	495,308	9,165	1.85	1.63	1.05	1.21
Bulawayo	446,636	15,387	3.45	3.83	6.82	7.35
Umtali	330,331	4,686	1.42	1.67	0.77	0.92
Gwelo	408,185	7,207	1.81	1.75	1.87	1.95
Victoria	529,442	24,921	4.71	2.49	5.36	5.14
Sinoia	73,746	622	0.84	0.19	0.05	0.13
Gwanda	147,900	12,656	8.561	8.32	12.71	11.72
Chipinga	69,586	4,718	7.19	3.16	4.80	8.89
TOTALS	2,501,134	79,362	3.174	2.88	4.42	4.72

It will be obvious that the contribution by the northern African areas (Midlands, Mashonaland and Manicaland) to the national beef economy is negligible via these sales—all sell less than 2 per cent. In spite of the fact that our Department is one of the strongest advocates of weight and grade sales, we are forced to the conclusion that one province (either Manicaland or Midlands) should be thrown open to all buyers and speculators on an experimental basis. Organized

marketing must, however, be retained in any province which has an area prone to foot-and-mouth disease.

SPECIFIED DISEASES

Foot-and-mouth disease

There were no outbreaks of foot-and-mouth disease during the period under review. The last infection was on Hippo Valley Estate, in August, 1967. As stated in last year's annual report, this outbreak was confined to 1,104 head of cattle and 423 sheep on the one property, and no extensions occurred.

Outbreaks were reported from three neighbouring countries—Kruger National Park in South Africa, Chobe region of Botswana, and in Mozambique. Fortunately, we are protected by nine-strand border game-fences on both the last-mentioned fronts, and by a good cattle-fence and cattle-free zone along the southern side of the Limpopo. Our own stock was withdrawn from the border in these areas and additional guards were posted.

Annual prophylactic vaccinations with S.A.T. II Subovax vaccine were given to 27,608 head on Liebig's Ranch.

Rabies

It is pleasing to report a considerable decrease in confirmed cases of rabies again this year—50 cases, compared with 165 last year and 224 in the year previous to that. Intensive efforts were made to eliminate this disease by keeping the immunity in dogs at a high level. The number of dogs vaccinated was a new record at 310,463—previous maxima were 263,040 in 1967 and 240,965 in 1966.

Rabies vaccinations

District	European	African	Police dogs and cats	Total	Specimens	Positive
Salisbury	7,663	57,635	59	65,357	100	4
Bulawayo	3,992	31,523	—	35,515	22	2
Umtali	2,172	47,128	—	49,300	71	29
Gwelo	2,337	39,861	—	42,198	24	1
Victoria	982	69,408	—	70,390	20	5
Sinoia	1,617	13,657	—	15,274	5	—
Gwanda	343	17,313	—	17,656	4	1
Chipinga	490	14,283	—	14,773	20	8
TOTALS	19,596	290,808	59	310,463	266	50
1966-67	27,065	226,212	—	263,040	519	165

Total dogs vaccinated since 6.9.50, 2,565,035.

Total positive cases since 6.9.50, 1,475.

Incidence in jackals has, fortunately, decreased sharply, from 78 last year to 12 in 1968, and these were confined to two centres. The jackal population is, however, excessive in all districts, and could again initiate a wave of infection as in 1966. We are indebted to the Department of National Parks and Wild Life Management for prompt assistance whenever requested in this and other spheres. Species incidence in the 50 positive was: 25 dogs, 12 jackals, nine bovines, two cats, one civet cat, one honey badger. Three specimens were received from outside Rhodesia for confirmation—one human and one bovine from P.E.A., and one dog from Malawi.

Contagious epididymitis and vaginitis

One thousand four hundred and forty-four bulls were examined and 83 were slaughtered for having diseased or abnormal testicles. Only two ranches regularly show induration of the epididymitis and remain in quarantine.

Lumpy skin disease

Mild cases occur sporadically in most provinces.

African swine-fever

There has been no recurrence of this condition following the slaughter, with compensation, of 771 African-owned pigs in a small area adjacent to our north-eastern border in August, 1967.

Anthrax

No cases were diagnosed in livestock. Annual revaccinations by departmental staff of previously infected premises amounted to 112,211 cattle, 31,037 sheep and goats, 508 pigs and 4,780 donkeys—a total of 148,536 head.

Tuberculosis

Imports tested, 420—no reactors.

Exports tested, 932—one reactor slaughtered—no lesions on p.m.

Meat inspection incidence

Of all cattle slaughtered at the C.S.C. abattoirs, only 22 head showed tuberculosis lesions. Of this figure, 13 head originated from one ranch where the disease is being eradicated.

Dairy cattle

Four hundred and twenty-six herds, comprising 45,807 head, are either attested or under test. Owing to shortage of professional staff, only 6,022

head were tested in 1968, revealing six reactors, of which only one showed visible lesions on slaughter.

Brucellosis

Infection rates are indicated by a survey carried out from samples from several districts—mainly of African-owned cattle.

African-owned cattle

District	No. of dipping centres	Cattle census	Samples sub-mitted	Positive	Doubtful	Percentage positive
Salisbury	64	76,800	1,514	8	6	0.5
Umtali	179	319,274	9,305	168	59	1.8
Chipinga	44	63,336	978	38	7	3.88
Gwanda	28	50,221	611	37	12	6.06
Sinoia	58	77,705	646	10	5	1.55
TOTALS	373	587,336	13,054	261	89	2.0

Total samples tested for contagious abortion numbered 22,478, of which 1,636 were positive and 750 doubtful—7.28 per cent. positive. S. 19 vaccine is used by approximately 60 per cent. of the European farmers; 197,308 doses were sold.

Vibriosis

The exact significance of this disease as a factor in our infertility problem is not known. One veterinary officer will be submitting a thesis on this condition for a Master's degree. Duphavac is being used on an experimental basis.

Newcastle disease

Newcastle Disease was confirmed on 19th September—the first recurrence of this condition since 1955. Infection has been more or less confined to African-owned poultry and, to date, appears to have been successfully limited to the outbreak area. Policy is based on slaughter of infected and contact birds, and vaccination of poultry in the surrounding areas.

Other conditions encountered in poultry were:

Fowl cholera: Four outbreaks — 645 birds slaughtered—compensation £231.

Fowl typhoid: Minor sporadic incidence — 54,841 fowls blood-tested—101 positive, destroyed.

Bacillary white diarrhoea: Nil—117,444 fowls tested—89 positive, cultures negative.

Fowl paratyphoid: Several species of *Salmonella* identified. Coccidiosis, leucosis, fowl-pox, aspergillosis, infectious coryza, etc., also caused minor losses.

Quarter-evil: There has been a substantial rise in deaths due to quarter-evil, from 455 in 1967 to 1,190 in 1968.

Tick-borne diseases: Mortality from tick-borne diseases has remained at approximately the usual incidence.

Other conditions causing serious losses annually are:

	1968 deaths	1967 deaths
Theileriosis	254	46
Redwater	110	174
Gallsickness	160	187
Heartwater	18	low incidence

Enterotoxaemia: 184 deaths recorded in sheep—132,950 doses of vaccine sold.

Botulism: 103 cattle deaths—71,150 doses of vaccine sold.

Aphosphorosis: 108 cattle deaths.

Veld poisoning: 656 deaths, of which 262 were due to *umkauzaan* (*Dichapetalum cymosum*).

Mineral poisonings: 850 deaths, of which 295 were due to arsenic.

Schistosomiasis: Approximately 300 deaths in sheep.

Trypanosomiasis: Direct control of the disease has entailed the taking and examination of 144,652 blood-smears, an increase of 14,099 over last year. The number of positive cases diagnosed dropped from 8,134 in 1967 to 6,313 in 1968. There are 388,683 head of cattle in trypanosomiasis danger areas. In addition to the smears examined, 164,879 curative or prophylactic injections were given to livestock.

Summary of tsetse-control: The full report of the A.D.V.S. (T. & T.C.) is available as a separate issue.

The anxiety expressed in the last annual report over the advances of tsetse fly and the increase of trypanosomiasis in several major areas has given way to a feeling of confidence that, if men and materials continue to be made available, our control measures will succeed in stabilizing the tsetse fronts. When this has been achieved, we shall be in a position to plan ahead for the reclamation from tsetse fly of uninhabited areas as they are required for development.

This year the insecticide D.D.T. has been used throughout our spraying operations, applied as a 5 per cent. suspension, diluted from a 75 per cent. (a.i.) wettable powder, in place of the 3.1 per cent. dieldrin emulsion used formerly. This D.D.T. preparation has been found to be at least as persistent under our conditions as the dieldrin, and is about one-fifth of the cost at the rate used in our work. We are thus able to cover more ground for the same cost. The tsetse habitat within 4,200 square miles of infected or threatened areas was treated by 30 teams of operators using 166½ tons of 75 per cent. D.D.T. wettable powder.

The threatened westward and south-westerly advance of tsetse and trypanosomiasis in the Wankie district, which had almost reached the Wankie National Park in mid-1967, did not develop after the timely redeployment of the selective hunting operations and the completion of an extensive application of insecticide as a barrier to advance of the fly. No cases of trypanosomiasis have been reported from the affected cattle centres west of the Gwaai River for the past six months.

Although trypanosomiasis persists in the Sipolilo and Doma farming areas, its lower incidence did not warrant the application of insecticide this year. However, its presence there is a threat which must be removed at the earliest opportunity.

In the Mtoko and Inyanga districts, the introduction of selective hunting operations and a further extensive application of insecticide have been followed by a marked decrease in the incidence of trypanosomiasis, and in catches of tsetse flies on relevant flygrounds.

Trypanosomiasis has virtually disappeared from the Chipinga border area. Only four cases of trypanosomiasis were reported in privately owned cattle; all were from two farms associated with the Umsiliswe drainages, where *G. pallidipes* is known to occur. One departmental bait-ox, used on surveys in the same area, also showed an infection. The decision to discontinue cutting and burning operations on the border clearing as a means of tsetse control has not been followed by adverse effects.

Further good progress is reported from the Sabi-Lundi area. Selective hunting operations and the extensive international insecticide-spraying operations have resulted in the disappearance of *G. morsitans* from areas where, a few years ago, large numbers could readily be caught. No tsetse flies have been caught for the past nine months

from any traffic-control point in the Sabi-Lundi area, nor for seven months on the cycle flygrounds which traverse the area to the north of the Lundi River. The only flygrounds which record catches in the area to the south of the Lundi are those adjacent to the international border, where *G. morsitans* have persisted since they were first recorded in 1956. Operations in this area, involving the resources of the Rhodesian, South African and Portuguese governments, are still in progress.

Less satisfactory reports come from the Gokwe and Gatooma districts and the southern portion of the Lomagundi district, where the extension of trypanosomiasis across the Umfuli as far to the east of Nyamfuti and Kanzamba dips, in Umfuli Tribal Trust Land, has given cause for great concern. Trypanosomiasis greatly increased, and *G. morsitans* were caught in abundance on the Mafungabusi Plateau, which has long been regarded as a natural barrier to tsetse. The extensive use of prophylactic drugs has prevented large-scale deaths, while the concentration of hunting effort and the application of insecticide to 1,732 square miles of tsetse habitat within the Umniati and Umfuli drainages are restoring control in this area. Operations are still in progress and initial reports are encouraging.

In the Vuti area, trypanosomiasis has remained persistently high and has extended to previously uninfected north Karoi farms. An extensive spraying operation covering the Vuti Unreserved Land farms, part of the north Karoi farms and the Naodsa Tribal Trust Land, is still in progress. Early indications of the effect on catches of tsetse and on the incidence of trypanosomiasis are favourable.

The general progress of the incidence of trypanosomiasis is shown in Figure 1. There was a progressive increase in cases following the termination of shooting game as a means of tsetse-control in September, 1960, to such an extent that it became necessary in October, 1964, to introduce selective shooting of the major hosts of *G. morsitans*. The number of recorded cases of trypanosomiasis fell rapidly until October, 1965, when hunting operations were suspended for reasons of security. There was a period of four months when no active tsetse-control measures were applied, and the modified form of hunting now in use took until July, 1967, to be fully operative. During this period of disjointed control activity, the number of cases rose to the maximum number ever recorded. However, since the resumption of selective hunting in all areas, and with the initial

effect of the 1968 insecticide-spraying operation, the total cases for the quarter from July to September, 1968, are lower than they have been since the corresponding quarter for 1965.

Selective hunting

The term "selective hunting" is used to denote destruction of the four species on which tsetse prefer to feed. These species are warthog, bush-pig, kudu and bushbuck.

The effect of intensive selective hunting operations on a local tsetse population is shown in Figure 2. The Gache Gache area has long been notorious as a heavily infested tsetse area, where warthog were abundant, and where human sleeping-sickness was endemic, but at a low level. It is now difficult to find tsetse flies, even when they are deliberately searched for. The graph shows the decline in numbers of tsetse flies caught, together with the progress of selective hunting operations, indicated by the histogram. The initial hunting, from May to October, 1965, was accompanied by a sharp decline in the numbers of *G. morsitans* caught on flygrounds A and B. Of the 835 animals killed during this period, 520, or 61 per cent., were warthogs. Hunting was suspended from November, 1965, until June, 1967, during which time the tsetse population showed signs of recovering. A modified form of hunting was introduced in June, 1967, which has been accompanied by a further, more gradual decline in the population to its present low level.

Chemotherapy

During the year, 164,879 doses of trypanosomicidal drugs were dispensed, of which 75,963 were curative and 88,916 were prophylactic. The use of the drug antrycide has gradually been discontinued. By September, 1967, it was being used only in parts of the Gokwe and Binga districts, and during this year, due to the appearance of widespread drug-resistance in Gokwe, and to the development of toxicity at three centres at Binga involving 46 deaths, it has finally been abandoned.

Cattle exposed to trypanosomiasis risk are now maintained almost exclusively on Berenil as a curative drug and on Samorin as a prophylactic. Berenil is an effective bovine trypanosomicide which is readily tolerated by the animal, but it confers little or no protection against further infection. Samorin, used at 0.50 mg./kg. and over, confers a lasting protection with little evidence of drug-resistance. Where resistance has arisen under these conditions it has been quickly eliminated by the use of Berenil.

RESEARCH

Veterinary research

The need to develop tsetse blood-meal identification techniques has interfered with some research projects, in particular the estimation of the mean curative doses in rats for various trypanosomicidal drugs.

A new laboratory, with a small animal-house, to be used for tsetse blood-meal identifications was completed and officially opened on 10th October, 1968.

At Lusulu and Rekomitjie research stations, long-term drug trials continue. Cattle which had received Samorin at two-monthly intervals for from four to six years were slaughtered at the Cold Storage Commission abattoir at Bulawayo. Apart from the total condemnation of the necks (the site of the injections), satisfactory grades were obtained.

Glossinology

Investigations into the toxicity to tsetse flies of commercial and new insecticides continue. Particular attention has been paid to the relative efficacy of deposits of dieldrin and D.D.T. as emulsifiable concentrate and as highly dispersed wettable powder. D.D.T., as a 5 per cent. wettable powder, was found to be at least as effective as 3.1 per cent. dieldrin emulsifiable concentrate under similar conditions. A mixture of these insecticides was found to be very persistent in its action.

Fire can greatly reduce the effectiveness of insecticide deposits. Tests have been carried out to measure the effect of fire on such deposits on rough-barked and smooth-barked trees.

Investigations carried out on an island in Lake Kariba indicate that the virtual disappearance of tsetse flies from the island is associated with the rapid decline in the warthog population which took place during 1966 and 1967.

VETERINARY RESEARCH BRANCH

Routine services

The development of biochemical and haematological sections have proved their worth during the year and are being increasingly used by staff and veterinary practitioners. Continuing bacteriological checks at Cold Storage Commission and Colcom were regularly undertaken throughout the year and are being increasingly relied on as

important indications as to the efficacy of the hygienic measures in use.

The following specimens were received for diagnosis:

General bacteriology	888
Rabies	273
Foetal	103
Blood	22,507
Milk	940
Tuberculosis	4
Quarter-evil	48
Poison	179
Enterotoxaemia	39
Leptospirosis	41
Dourine	43
Poultry post-mortems	5,547
Rabbit post-mortems	79
Chinchilla post-mortems	143
Pig post-mortems	69
Sheep post-mortems	58
Calf post-mortems	21
Miscellaneous	263
Plants	13
Tampons (<i>Vibrio foetus</i>)	3,578
Histological	443
Haematological	1,799
Biochemical	1,027
Various specimens ex Cold Storage Commission	36,951
Equine pregnancy tests	15
Faeces samples	89
TOTAL	75,160

Schistosomiasis

The emergence of this condition as a clinical entity in cattle and sheep has stimulated further work by Mr. Lawrence, our pathologist, on curative trials. The year's work appears to indicate that Stibophen is the most effective drug at present available for cattle, while Lucanthone appears most suitable for sheep. It is hoped that the exploratory inquiries already made may lead to the submission of further drugs for trial by some of the drug firms known to be interested in the human bilharziasis field.

The ubiquitous nature of the parasite and the known widespread occurrence—a 1960 survey of 2,509 cattle being processed through the Cold Storage Commission Works, Salisbury, revealed that 69.15 per cent. carried the parasite—makes treatment of affected herds the only effective method of control at present. However, there is no doubt that, if further extensive outbreaks occur, consideration must be given to such measures as controlled drinking-points and spraying of all open water.

Investigations to date suggest that there is a nutritional factor involved, since recovery is more rapid in animals not under stress.

Preventive and curative services

The marked increase in vaccine sales from 1,388,167 doses in 1967 to 1,891,907 doses in 1968 is indicative of the farming response to the drive for diversification and also of the seriousness with which the new stock ventures are being undertaken. Both in cattle and sheep vaccines, the increase has been most impressive.

The appearance of a clinical encephalitic entity among cattle, apparently associated with revaccination with our quarter-evil and quarter-evil/malignant oedema vaccines, has been investigated. No infective agent has been isolated and, although no definite proof has been produced incriminating our vaccine, we reorganized our production and are now using a liver and mead media instead of a liver brain media.

Poultry

The increasing importance of poultry, which now ranks third in the economics of our animal husbandry, is shown in the ever-increasing demands made on this section. Trials carried out this year indicate the possibility of control of coccidiosis by vaccination, but indicate a certain risk where the accidental introduction of a field strain of a species different from the vaccine strains may cause unexpected losses.

Deep-frozen redwater vaccine

Fairly extensive trials were undertaken this year and showed that deep freezing provided a satisfactory product, firstly, from the point of view of travelling viability and, secondly, by producing a vaccine containing a more or less constant number of parasites for any one batch and, therefore, more likely to give consistent results.

Tick survey

Dr. Jooste continued the survey work during the year. Part of her report indicated a developing degree of resistance to arsenicals, especially in the African areas. This is an important field in which we hope to undertake more extensive work, once facilities can be provided at Hatcliffe.

MEAT INSPECTION

Meat hygiene laboratories

The establishment of a meat laboratory in Bulawayo to augment the work already being

done in Salisbury has been a major step forward in the control of meat and abattoir hygiene.

Extensive use is being made of the sausage agar technique for surface sampling, and carcasses, joints, equipment, working surfaces, operators' hands, working room interiors and packing materials are all under regular or periodic scrutiny for bacterial contamination. Special projects under way include a comparative study of different cleaning methods and materials in the boning room, and studies on dressing, washing and drying methods for carcasses on the slaughter floor.

Regular swab samples of drains, abattoir effluents and sewers are now undertaken, so far with very encouraging results regarding the absence of salmonellas and other important pathogens. Biochemical, microscopic and bacteriological procedures are now used as valuable aids to diagnosis at meat inspection.

Abattoir improvements

While the over-all meat hygiene standard at all C.S.C. abattoirs is now more than satisfactory, the securing of further improvements in buildings that have inevitable shortcomings by modern standards is a task that has no end. In this respect it is a pleasure to record that the C.S.C. managerial staff has been most co-operative and helpful, so that production and hygiene are now normally considered as inseparable entities. Progress can be recorded at all centres.

Salisbury C.S.C.

Major improvements during the year include the resurfacing of the dressing floor and the redesigning of the offal section downstairs. Heads and offals are now all dropped through protected stainless-steel chutes to their individual processing areas below, and separation of clean and rough products is complete.

Colcom

Satisfactory standards have been maintained, with minor improvements in respect of condemned offal receptacles and pluck-hanging arrangements.

Bulawayo C.S.C.

Undoubtedly the major event of the year has been the acquisition, through the generosity of the C.S.C., of commodious office and laboratory

accommodation for the meat hygiene staff. The provision of a well-fitted-out detention-room has not only improved inspection facilities but has proved invaluable as a demonstration-room for teaching purposes.

Proposed Gatooma factory

The extended and meticulous planning stage of this new C.S.C. works has been completed, and initial work has started on the factory site. Due regard has been shown by the C.S.C. planning committee for all points raised by this Department's representatives in regard to meat inspection and hygiene requirements.

Slaughter figures

Slaughter figures for pigs, sheep and goats at the C.S.C. abattoirs have shown a marked increase, compared with the 1966-67 year. Cattle figures have, however, been fractionally down. It is expected that the usual upward trend will be seen again in the coming year. One disturbing feature noted is the number of cows slaughtered when heavy in calf.

Total condemnations of carcasses

Gross statistics

	Cattle	Sheep	Goats	Pigs
Salisbury	482	23	23	431
Bulawayo	603	55	52	1,654
Fort Victoria	501	6	14	155
Umtali	54	10	1	8
TOTALS	1,640	94	90	2,248
1966-67	1,757	201	27	1,010

Main reasons for condemnation

Cattle	Salisbury	Bulawayo	Ft. Vic.	Umtali	Total	1966-67
Cysticercosis	149	273	114	5	541	626
Eosinoph. myositis	77	118	107	5	307	246
Emaciation and oedema	54	38	107	15	214	269
Pleurisy and peritonitis	17	27	62	0	106	150
Pyæmia	50	25	9	2	86	60
Trauma	37	15	19	2	73	68
Anaplasmosis	0	23	22	1	46	—
Icterus	26	16	1	0	43	27

Sheep and goats	Salisbury	Bulawayo	Ft. Vic.	Umtali	Total	1966-67
Emaciation and oedema	13	68	16	3	100	178
Pyæmia	25	8	0	3	36	21
Cas. lymphad.	3	4	1	0	8	0

Pigs	Salisbury	Bulawayo	Ft. Vic.	Umtali	Total	1966-67
Cysticercosis	215	1,455	145	3	1,818	670
Pyæmia	149	8	4	2	163	122
Sarcocysts	1	139	1	0	141	37
Pleurisy and peritonitis	38	3	3	0	44	0

Cattle condemnation figures show an over-all decrease of 0.03 per cent., compared with the previous year. This is accounted for largely by the reduced number of generalized cysticercosis cases, as well as lower incidence of pleurisy and peritonitis, and emaciation with oedema—the last-mentioned despite the drought. Eosinophilic myositis has shown a notable increase.

Sheep and goat condemnations are lower as an over-all figure, due largely to the marked reduction in emaciation.

Pig carcasses showed marked increases in measles and sarcocysts, while the percentage incidence of pyæmia has remained about the same.

Cysticercosis

Beef measles (*C. bovis*)

	Condemned	Detained	Total
Salisbury	149	688	837
Bulawayo	273	1,899	2,172
Fort Victoria	114	824	938
Umtali	5	65	70
TOTALS	541	3,476	4,017
1966-67	626	3,093	3,719

These figures reveal an increase in over-all measles incidence of 0.14 per cent., or an 11 per cent. increase of detected cases. While our over-all figure of 1.43 per cent. is very low, compared with the figures available from the rest of Africa, there is, nevertheless, no room for complacency, as every passing year reveals a further jump in the incidence graph. Until purposeful attempts at the detection and treatment of human tapeworm carriers are made by beef producers, through the

health authorities, we can look forward to a steadily deteriorating position.

Pork measles (*C. cellulosae*)

Condemned 1966-67		
Salisbury	215	93
Bulawayo	1,455	504
Fort Victoria	145	72
Umtali	3	1
TOTALS	1,818	670

The percentage incidence has doubled over the past 12 months. This is largely associated with an increase in slaughterings of African-owned free-range pigs, in which the measles incidence is becoming comparatively high. This is illustrated by the returns from Bulawayo and Fort Victoria, where free-range pigs form a substantial part of the kill.

In Bulawayo, 67 per cent. of the kill was African-owned, and in Fort Victoria 29 per cent.

The comparative incidence of measles in the two ownership groups at these abattoirs is as follows:

	European-owned infected	African-owned infected
Bulawayo	0.03%	4.68%
Fort Victoria	0.12%	4.48%

Traumatism

Whole carcasses condemned

	Cattle	Sheep and Goats	Pigs
Salisbury	37	—	10
Bulawayo	15	3	2
Fort Victoria	18	1	—
Umtali	2	2	1
TOTALS	72	6	13

Other portions condemned in cattle include 28 quarters or limbs, 1,388 tails and 19.4 tons of weighable trimmings.

From the above figures, it is estimated that approximately 37 tons of beef had to be condemned as a result of physical injury. The nature of the bruising and fractures encountered indicated that the majority of damage occurs in transit, due to trampling and horning. The presence of cows and horned cattle in consignments are major factors causing serious trauma.

Tuberculosis

Cattle

	Localized	Generalized	Total
Salisbury	1 (lungs)	2	3
Bulawayo	10 (lungs/gut)	6	16
Fort Victoria	1 (lungs)	2	3
Umtali	—	—	—
TOTALS	12	10	22
1966-67	3	1	4

Of the total of 22 cases, 13 originated from one ranch; mainly old cows were affected. The incidence of generalized cases, although higher than in the past few years, can still be considered negligible at 1 : 28,065.

Pigs

A total of 55 carcasses with tubercle-like lesions were disclosed, of which only two showed generalized infection. The remainder of the lesions were confined to the head.

All suspicious lesions yielding acid-fast organisms in smears are regarded as being tuberculosis. While there is a strong likelihood that *M. intracellularis* or other related mycobacteria may well be responsible for a proportion of cases, the very small incidence (1 : 2,727) does not justify laborious and time-consuming differential diagnosis.

Hydatidosis

Cattle

	Lungs	Liver	Spleen	Heart	Cattle affected
Salisbury	409	73	—	—	482
Bulawayo	2,198	84	2	1	2,279
Fort Victoria	762	59	2	—	789
Umtali	26	5	—	—	29
TOTALS	3,395	221	4	1	3,579
1966-67	3,618	151	—	—	3,696

The total of cattle affected amounts to 1.28 per cent., which is identical to the previous year's figure. Almost every cyst opened was found to be fertile, including the rare heart-lesion.

Liver Fluke (*F. gigantica*)

Cattle	Livers affected	(1966-67)
Salisbury	51,562	31,695
Bulawayo	16,673	17,767
Fort Victoria	10,515	8,892
Umtali	1,580	1,116
TOTALS	80,330	59,470

These figures grow more alarming every year, and have shown nearly a 40 per cent. increase in incidence over the previous year's percentage, attributable almost entirely to a dramatic increase in Mashonaland. Even at a conservative estimate, it is certain that the weight of condemned livers and trimmings due to fluke damage alone is approaching the total weight of beef carcasses condemned for all reasons. If the reduction in weight gains is added to the value of condemned fluky livers, the total financial loss to the Rhodesian beef industry must run well into six figures, and all this for a single parasite which can be controlled.

Sheep

Only eight fluky livers were found in this species, all at Umtali C.S.C.

Liver tapeworm (*Stilesia hepatica*)

Livers affected

	Cattle	Sheep and goats
Salisbury	473	18,684
Bulawayo	316	23,942
Fort Victoria	318	2,841
Umtali	6	2,730
TOTALS	1,113	48,197
1966-67	525	32,079

This parasite appears to be adapting itself more readily to cattle, which show more than twice the incidence of the previous year.

The incidence in sheep remains about the same—it can scarcely go any higher. No benefit is apparent following the appearance on the market of an effective remedy.

Milk spot in pig livers (*Ascaris suum*)

	Livers condemned
Salisbury	10,276
Bulawayo	2,280
Fort Victoria	988
Umtali	367
TOTAL	13,911

These figures bear out the logical assumption that, whereas the free-range pig is most likely to become affected with cysticercosis, the intensively raised animal is more subject to ascariasis. Salisbury and Umtali kill more European-owned sty-raised pigs, while Bulawayo has a very large African-owned pig kill. The incidence of milk spot is much higher in baconers than porkers, thus lending weight to the theory that milk spots are an allergic manifestation following a second wave of infection in a sensitized animal.

Animals dead on arrival

	Cattle	Sheep and Goats	Pigs
Salisbury	—	—	104
Bulawayo	10	16	19
Fort Victoria	5	—	1
Umtali	2	—	—
TOTALS	17	16	124

The majority of deaths in transit are due to stress, suffocation or trauma, and in no case was any contagious disease diagnosed. The notable, and regrettable, feature is the large number of pigs arriving dead on rail in Salisbury. This vexed problem is under active investigation by the veterinary officer employed by the Pig Industry Board.

I acknowledge with thanks and appreciation the conscientious devotion to duty of all staff. Their efforts have maintained the good control of epidemic diseases, which is so necessary to Rhodesia at the present critical time.

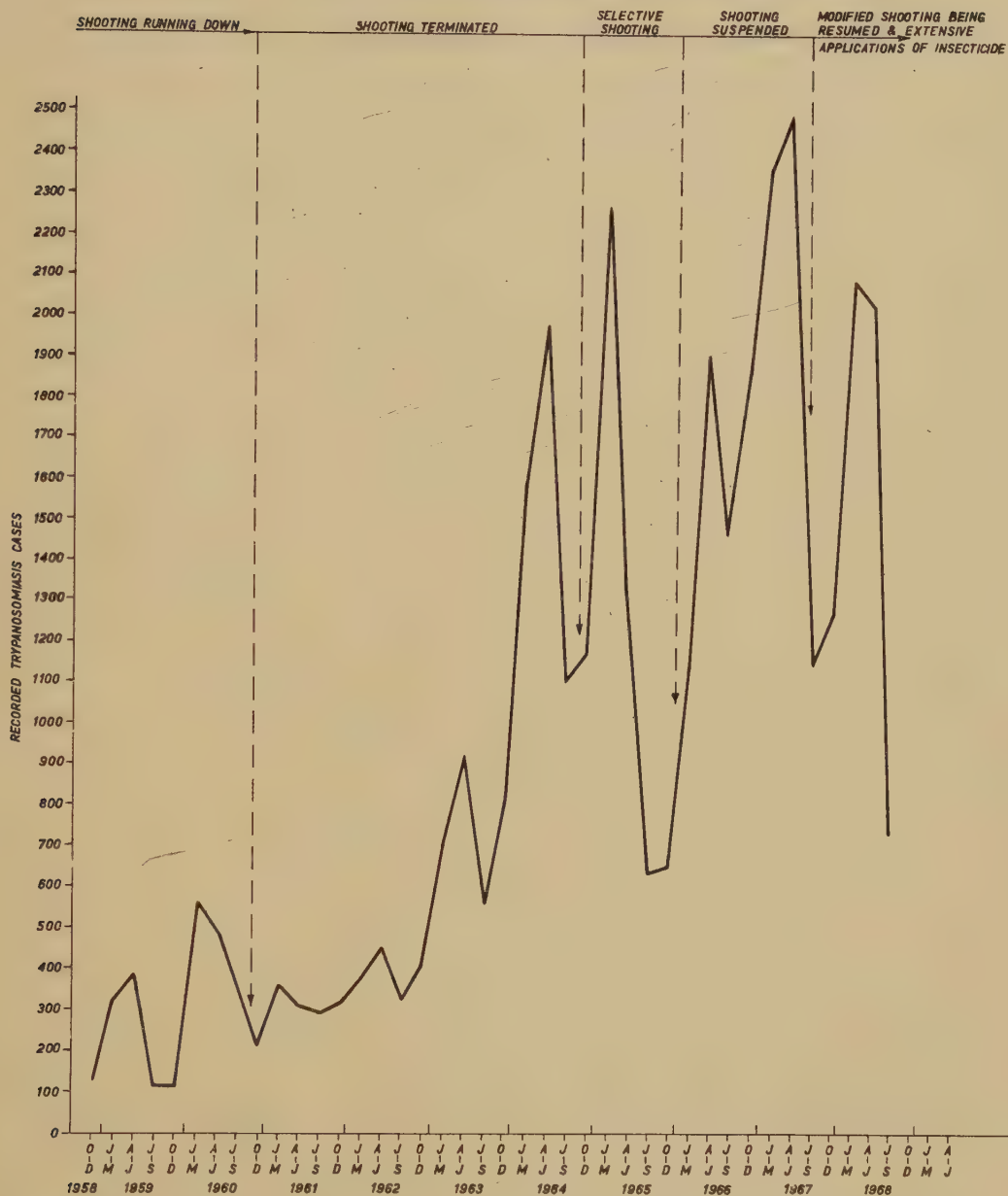
J. M. WILLIAMSON,
Director of Veterinary Services.

PUBLICATIONS

The following contributions have been published or presented for publication during the year:

- Boyt, W. P. The immunology of trypanosomiasis. Paper presented to the Zambia Veterinary Association Congress, November, 1967.
- Boyt, W. P. and MacKenzie, P. K. I. The toxicity of Berenil. Paper read to Rhodesia Veterinary Association Congress, June, 1968.
- Casewell, T. J. The control of tsetse and trypanosomiasis in the north-eastern districts of Rhodesia. Paper read to the Eighth International Congress of Tropical Medicine and Malaria, Teheran, September, 1968.
- Cockbill, G. F., Pilson, R. D. and Vale, G. A. Observations on populations of *Glossina morsitans* Westw. and of Game mammals on Island 173/174, Lake Kariba, Rhodesia (in press).
- Dame, D., MacKenzie, P. K. I., and Boyt, W. P. Transmission of trypanosoma by chemosterilized *Glossina morsitans* males (in press).
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FIG.1: TOTAL CATTLE TRYPANOSOMIASIS CASES 1958-1968 (QUARTERLY FIGURES)



NOTE:-

1. Seasonal incidence
2. Peaks usually occur April-June.
3. Rapid increase in cases after termination of shooting in 1960.
4. Anticipated Apr.-Jun. peak of 1965 did not appear following selective shooting operations.
5. Rapid increase after suspension of selective shooting operations at the end of October 1955.
6. Resumption of hunting operations a gradual process:-
Sabi/Lundi complete resumption and Sebungwe partial resumption February 1966.
Sebungwe and Gokwe/Sanyati complete resumption Sept 1966.
Urungwe partial resumption March 1967.
Urungwe and Sipolilo complete resumption July 1967.
7. Quarterly total for Jul.-Sept. 1968 is the lowest since Oct.-Dec. 1965.

FIG. 2: MONTHLY KILLS OF SELECTED HOST SPECIES AT GACHE GACHE (KARIBA)
AND CATCHES OF *G. MORSTIANS* ON RELEVANT FLYROUNDS (A & B)

